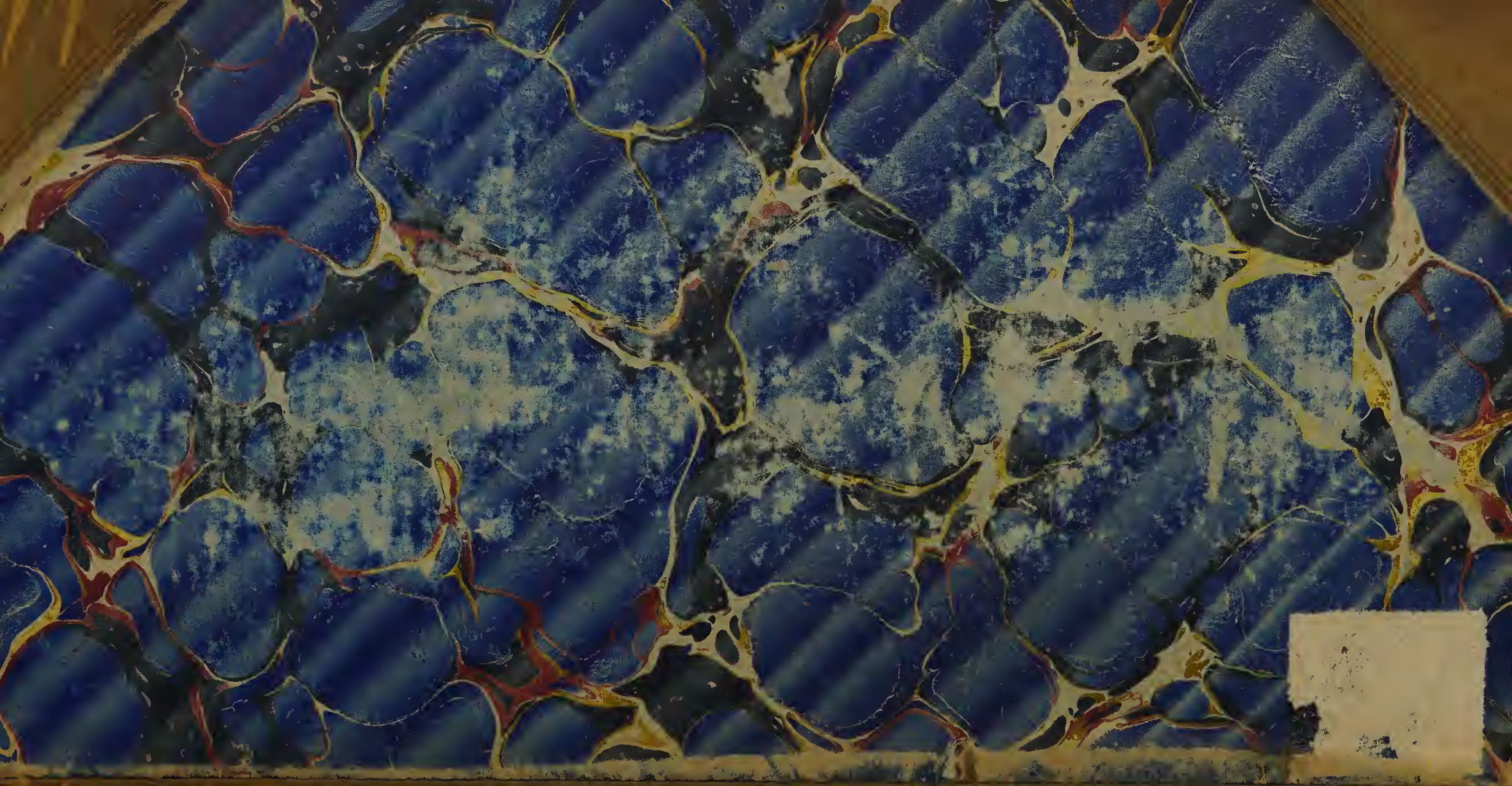

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THE PHARMACEUTICAL JOURNAL.

VOL. XVII.—No. I.—JULY 1st, 1857.

PHARMACEUTICAL EDUCATION.

There is a manifest improvement and tendency to progress in the rising generation of Pharmaceutists at this time. The School of Pharmacy was never so well attended as it has been during the present session, and the number of candidates for examination appears to be on the increase. The study of botany, which has hitherto been too much neglected, is gradually acquiring that amount of importance which it deserves, as a branch of the education of the Pharmaceutical Chemist. Upwards of eighty students have entered the class during the present session, and the regularity of the attendance indicates a growing interest in the subject. At this season of the year the study of botany is an agreeable pursuit, and the lectures, being delivered in the gardens of the Royal Botanical Society in the Regent's Park, afford an opportunity for combining fresh air and exercise with professional improvement, The Chemical Class is also well attended, and the number of pupils in the Laboratory has been greater than during any previous session. In some instances, however, the period of study has not been so long as to ensure a competent knowledge of the principles and practical details of the science; and it is a mistake to suppose that this object can be attained by merely working in the laboratory during two or three months. This short time may be sufficient to initiate the student in the elementary principles, and to awaken his interest in the science; but those who desire to obtain a complete qualification for their profession, and to enjoy a favourable position for success in after life, must make themselves familiar with the entire range of the subject, including organic and inorganic chemistry, and especially the manipulations of the pharmaceutical laboratory.

On taking a review of the last sixteen years, the gradual but steady progress of Pharmacy in this country is very satisfactory, considering that the acquirement of this branch of education is entirely voluntary, and has enjoyed little or no encouragement on the part of the Legislature. In fact, the only inducement held out to the student as a stimulus to his industry has been the prospect of an honorary title.

Recent events, and the notoriety of the deliberations which have taken place respecting the sale of poisons, the dispensing of medicines, and the prevention of accidents, have led to a prevailing impression that some legislative enactment will shortly place Pharmacy in a position which it has not hitherto occupied in this country. The natural tendency of such a prospect has been observable in the increasing activity among Pharmaceutical students, the frequent enquiries respecting the books which should be read, the lectures to be attended, and the best course to be pursued by those who are dependent entirely on their own resources for improvement, and who in country towns remote from the advantages of a school or college, are desirous of qualifying themselves for passing the examination. The voluntary system has effected a very marked improvement, but it is in the power of the Legislature to multiply these advantages tenfold.

THE TWO MEDICAL BILLS.

Early in the present session a prospect existed, or was supposed to exist, that the long debated question of Medical Reform was at last about to be settled to the satisfaction of all parties. The Bill introduced by Mr. Headlam came forward under more favourable auspices than any of its predecessors. Previous Medical Bills having emanated from the ranks of the profession were framed with a view of reforming the governing bodies, and extending to the many certain honours and privileges which had hitherto been distributed with a sparing hand among the few. These bodies enjoying powers under royal charter of incorporation or Act of Parliament, while professing to be disposed at all seasonable times, and in a reasonable manner, to set their houses in order, were not so earnest in the cause as to initiate a measure of reform themselves, and were sufficiently tenacious of their existing powers and privileges to watch with a jealous eye any proposed innovations emanating from without. Consequently, as each Medical Bill in succession passed through the preliminary stages of incubation, prior to its introduction in a tangible form into Parliament, wet blankets were prepared at the three seats of professional wisdom—Pall Mall East, Lincoln's Inn, and Blackfriars—with which the offspring, the object of so much solicitude, was smothered before it had time to be invigorated by the inspiration of the atmosphere of St. Stephen's. Thus one Medical Bill after another was concocted, read the first time, and became waste paper; and one party of Medical Reformers after another gave up the attempt in despair, if not in disgust. But though the fire of enthusiasm was extinguished, a spark remained which at intervals received a fresh impulse by some transient breeze, and each session had its Medical Bill as regularly as Parliament was ushered in by a Queen's Speech; but neither the Bill nor the Speech became, or was likely to become, the law of the land.

It happened in process of time that the breath of public opinion began to blow towards physic, and the embers of Medical Reform received a supply of oxygen from a fresh source. The Medical Corporations perceiving the signs of the times took counsel together.

They had resisted the "one faculty" storm which threatened destruction, but the mild, popular breeze was favourable to the safe navigation of the craft.

Delegates from the several Corporations in London, Edinburgh, and Dublin held preliminary meetings, with a view of ascertaining whether it might not be possible to agree as to the outline of a scheme for Medical Reform which should be generally acceptable to the profession, and at the same time beneficial to the public. This first step having been taken with apparent success, the principles agreed upon were embodied in the form of a Medical Bill, similar in some respects to the one which Mr. Headlam, with the advice and concurrence of several of the parties concerned, had introduced last session. Before deciding as to the details of the measure, communications were made with the representatives of the universities in England, Scotland, and Ireland, and it was finally supposed that all material difficulties had been overcome, and that the essential features of the Bill being satisfactory, such amendments as might on further discussion appear desirable could be introduced in the Committee of the House of Commons.

It appeared as if for once the entire Profession was united, and the Medical Bill safely started on the Parliamentary train. The honour of placing an obstruction on the rail at this critical juncture belongs to Lord Elcho. A collision is unavoidable. The prospect of passing a Medical Bill, even in the absence of any decided opposition, was precarious, as a variety of debatable points might arise in committee; and it is not at all difficult for a party who may be in a minority on any point to throw out a Bill of that description. The co-existence of two Bills, so similar that the questions at issue might have been

settled in committee, and yet so different in some respects that each has a phalanx of supporters in antagonism to the other, can only lead to one result,—which is the defeat of both.

Lord Elcho's Bill took its origin in the Universities of Scotland, where its principal advocates reside, but it is also preferred by the Apothecaries in Ireland, and the grounds of this preference are peculiar, as will be presently stated.

In each of the Bills it is proposed to constitute a Governing Council, which, according to Mr. Headlam, is to consist of twenty-three members—seventeen being appointed by the Universities, Colleges, and Halls, and six by the Crown. Lord Elcho limits the number to thirteen, all to be appointed by the Crown. This question might have been easily settled by an amendment, to the effect "that the Government being proverbially immaculate, and incapable of favouritism in the distribution of patronage, it is expedient that the Profession shall relinquish the right of interference in the management of its affairs, and that the Prime Minister for the time being shall be *in loco parentis*." This might have been decided by one division in committee.

The main feature of distinction between the two Bills may be concisely stated to be, that by Mr. Headlam's Bill the classification of the profession into Physicians, Surgeons, and General Practitioners is preserved, the existing corporations constituting the machinery for carrying the Act into effect. Lord Elcho's proposal resembles the "one faculty" scheme, establishing one standard or minimum qualification under Government jurisdiction, and leaving the Colleges of Physicians and Surgeons in the condition of voluntary institutions without legislative authority. He also entangles the question by confounding the functions of the Scotch Universities, which are educational as well as examining, with those of the London University, which are confined to examination.

The Irish Apothecaries object to Mr. Headlam's Bill because it does not assign to them the same position as it does to the Apothecaries in England, and they prefer Lord Elcho's Bill, because it waives all distinctions of rank, and allows them to participate in the general mediocrity. It is important to observe the distinction between the English and the Irish Apothecaries. The former are Medical Practitioners in the strict sense of the term, the latter are, in fact, Pharmaceutical Chemists; they enjoy exclusive privileges IN PHARMACY, no other class being empowered by law to dispense prescriptions; they can scarcely expect to enjoy the full rank of Medical Practitioners while their primary and peculiar privilege is a monopoly of the shop. The remedy is in their own hands. Let each member of their body make the election between the medical and the pharmaceutical functions. Let a body of Pharmaceutical Chemists be constituted, and let those who aspire to professional position as Medical Practitioners quit the retail trade of a Druggist.

There is one other distinction between the two Bills which ought to be pointed out: Mr. Headlam proposes that the Pharmacopœia shall be published by the Colleges of Physicians of the United Kingdom, under the direction of the representative Council. Lord Elcho entrusts this duty to the Council appointed by the Crown; by which latter arrangement we might anticipate the advantage of a variety of new formulæ from the Home Office, with particular directions for distinguishing all poisonous substances by means of red tape.

ON THE JUDICIOUS USE OF THE SENSES.

To a person of reflecting mind, fresh from a popular lecture on the anatomical structure of the human frame, a recital of the casualties to which a boy is exposed in the course of the usual "seasoning" at a public school might cause a momentary shudder. Yet there are, even among the refined and thinking classes of society, many advocates of public schools, on the ground that this kind of

training sharpens the wits, improves the faculties, and teaches the recipient of the orthodox buffeting and contusions to take care of himself.

The only son of an anxious mother may be spared this rough ordeal; he may have the benefit of a guarded education at home; but sooner or later he must find his level, and fall back upon his senses for protection in the ordinary vicissitudes of life.

The children of the poor run slipshod in the streets in crowded thoroughfares, they toil in factories among machinery, or climb the rigging of ships; many of them, overworked and scantily fed, are exposed to numerous dangers, with no protection but their own natural sagacity or instinct. The pampered victim of luxury, in spite of all the care of his nursemaid, puts his finger in his eye, or tumbles into the fire, while a child of the same age in a cottage is left in charge of a younger brother or sister with safety to both. The parents may be equally solicitous for the welfare of their children, but they act upon principles diametrically opposite—in one case endeavouring to provide a substitute for, and in the other cultivating and improving, the senses.

The Legislature is, figuratively speaking, the parent of the public, but acts upon no fixed principle in this respect. Sometimes a dreamy lethargy prevails, during which period the "child" may drown, burn, or poison itself at pleasure. It is supposed to be responsible and capable of taking care of itself and all its brothers and sisters. Then a new light dawns upon its anxious parent—a horse has been stolen and the stable door must be shut—some casualties have occurred, and the wisdom of the learned professions is concentrated in the endeavour to frame Acts of Parliament for the prevention or cure of "all the ills that flesh is heir to."

This paroxysm of parental anxiety gives rise to a variety of schemes for sanitary reform, limited liability, water supply, the protection of the simple against fraud and adulteration, the safe custody of poisons, restrictions on public-houses, the limitation of the hours of labour, and the general suppression of slavery at home and abroad. Nasty smells must be analysed by officers of health, the ramifications of drains must be investigated, a supply of water forced into every house, whitewash lavished upon dirty hovels; the purchase of provisions and the investment of money, the contracts between master and servant, the cost of travelling, and many other matters relating to the safety or comfort of the public are to be regulated by special Acts of Parliament, to the intent that "the wayfaring men, though fools, shall not err therein." The beneficial tendency of this kind of legislative activity cannot be doubted, provided always that the enactments introduced for such praiseworthy objects are consistent with common sense and with each other, and that the responsibility is duly balanced between the powers that be and the people who suffer.

In a factory, where complicated machinery is in rapid motion, the law requires that the dangerous shafts and fly-wheels shall be securely fenced round, to guard against accidents, and that the persons in charge of the engine shall be properly qualified for this duty. In the event of any fatal occurrence resulting from a neglect of the prescribed regulations, a heavy responsibility rests on the guilty party.

The district surveyor, who is consulted in the building or alteration of every house within his jurisdiction, is required, before his appointment to the office, to give evidence of skill and experience in his profession; and pilots are under equally strict regulations with regard to professional capability.

The legal profession is confined to men regularly educated, examined, and licensed, in order that the public may not be defrauded by the assumption of pretended skill by incompetent persons.

In the army and navy, an essential part of the preliminary training consists in a practical acquaintance with the use of fire-arms, and the laws of nature relating to projectile forces; these weapons being instruments of defence, or

sources of danger, according to the skill or the inexperience of those who handle them.

The value of these precautions in all matters in which the uninitiated public are incapable of self-protection is obvious, as no amount of sagacity or exercise of the senses would enable a person to guard against the danger and injury which might result from the incompetence of the responsible parties, in the instances above cited.

There are other agents quite as dangerous as fire-arms or steam-boilers, though more silent in their operation. The vegetable and mineral kingdoms abound in instruments of life or death which, in the hands of the ignorant or the unscrupulous, are equally prejudicial, although the risk to the public is less obvious to the senses. Most of these substances are valuable medicines in constant use. Medical men who prescribe, and Chemists who dispense them, are acquainted with their properties. They know that not only the popularly known poisons, but a large proportion of the remedies comprised in the Materia Medica, are injurious if not dangerous to life, when administered in excess; and they have for many years endeavoured to convince the public and the Legislature that some precautions are necessary in reference to these substances.

The first precaution which common sense would suggest, is the one adopted in the case of factory-engines, steam-boats, fire-arms, and other dangerous instruments—founded on the nursery proverb, "Little children should not play with edged tools"—namely, that the persons entrusted with the charge of such articles should be required to understand their nature, and the responsibilities belonging to them. If a boy, unacquainted with the properties of steam, were to tie down the safety-valve of a boiler and then stir up the fire, an explosion would, in all probability, expose his ignorance and blow him into the air; an act of stupidity equally dangerous to life in the sale or administration of a poison, might escape detection for want of a link in the chain of evidence, because in this case no explosion proclaims the fact, and dead men tell no tales. But this rather increases than diminishes the importance of intelligence and knowledge in those who have to deal with such destructive though silent agents. The next precaution is one also adopted in factories, that of fencing round the dangerous shafts and fly-wheels: for though all parts of a factory engine are dangerous if tampered with when in rapid motion—which is equally the case with medicines if administered improperly or in excess,—yet it is sufficient to protect those parts of the machinery which experience shows to be most hazardous; and with regard to the remainder, the inmates are taught to take care of themselves by a proper use of their senses. So in medicine, there are certain deadly poisons requiring especial precautions, while others may be safely entrusted to the public at the discretion of competent and intelligent dispensers.

For example, in an Act for regulating the sale of poisons, supposing schedule A to contain a very limited number of those which are most dangerous, and to which the special restrictions should apply, schedule B might contain a much more extended list, with the simple proviso that they should only be sold or dispensed by qualified Medical Practitioners or registered Pharmaceutical Chemists, reserving the vested rights of persons in business as Chemists and Druggists before the date of the Act.

This principle is entirely overlooked in the Poison Bill now under the consideration of the profession, and in order to test the principle on which that measure is based, we need only describe its operation at the counter of a Pharmaceutical Chemist.

We may premise that it is of the utmost importance that the dispenser of medicine shall be interrupted as little as possible in the performance of a duty which requires the calm exercise of his judgment and experience. On receiving a prescription, he reads it through that he may fully understand it and satisfy himself that it is correct and clear; it being his duty, in case of any mistake, at once to detect it, and, if needful, to send to the prescriber. Supposing the pre-

scription to contain two or three preparations in schedule A, he fetches the bottles from the poison closet. Having weighed or measured the quantities required, he must either again leave the counter, replace the poisons and lock up the closet, which would be very inconvenient and likely to lead to some mistake, or the poisons remain before him until he has finished the prescription. In this latter case he is liable to a penalty for not locking up the poisons immediately. Other prescriptions come in containing poisons—probably one of those he has been dispensing. It is not in the closet, and he hears the inquiry, where is the prussic acid? or, who has the antim. tart.? He hands over the bottle to his neighbour with the key of the closet. In the mean time a customer at the next counter asks for an ounce of oxalic acid, and a long catechising takes place as to the purpose for which it is wanted, whether the indigo or soot would be objectionable? Who signed the certificate? Is he the clergyman of the district? or is he a veritable justice of the peace? The handwriting is not known. Then a witness is required—who knows the witness; six entries must be made in the poison-book. While this is going on he is interrupted by an inquiry for the key of the poison-closet, and another person is waiting for the book to register a pennyworth of white precipitate. A patient wants a dose of an opiate he is in the habit of taking. Is that preparation in schedule A or in schedule B? If in schedule A, where is the certificate? He has none. Probably some opiate in schedule B would answer the purpose. After a discussion of ten minutes, a substitute is agreed upon, the patient pays twopence, and goes out grumbling because he is not allowed to have his usual medicine. On a market day in a country town, or in a London house during the busy season, the confusion occasioned by the poison-closet, the certificates, the entries in the poison-book, the search for square bottles, the discussions as to whether this or that preparation is in schedule A or in schedule B, and whether the case comes under the exemptions in clause 11, with all the vexatious disputes about soot, indigo, and archil, would be sufficient to bewilder even a fully competent assistant, and deprive him of the calm use of his senses. In the midst of this distraction he recollects, to his dismay, that for the first offence he is liable to a penalty of £20, for the second he will be disabled for life.

Let us shift the scene to the sick-room at midnight. A nurse, half asleep, proceeds to give the patient a dose. She has been initiated in the merits of the Act of Parliament. She can recognize medicines by the touch, without taking the trouble to read the label. She stretches forth her hand, and takes up a square bottle. "No, that is poison. Here is a round bottle; this must be right." She pours the medicine into a glass, the patient swallows it, and goes to sleep—a very sound sleep.

The sun dawns upon the sagacious nurse; she observes that the patient is still motionless, and says to herself, "How strange! and so restless as he was the night before! I hope I gave him the right stuff?" By a sudden impulse, she turns round and reads the label on the bottle, "A teaspoonful to be taken in water every 4 or 5 hours, when restless." The bottle contained sixteen doses: it was not a poison bottle, and the nurse was very careful in using one of her senses, but quite forgot to use the other.

COMPETITION AND PUFFING.

A CORRESPONDENT has sent us a list of medicines with prices attached, being a tender for the supply of a Dispensary, rejected in favour of a lower tender. On looking over the list, the question suggests itself, "What will the drug trade come to?" If medicines are to be furnished to public institutions at cost price, or in some instances at prices for which they could not be purchased in the wholesale market, what description of drugs are the poor likely to receive? The mischief resulting from this excessive competition in a class of commodities the

quality of which is not readily distinguished by the purchaser, has been frequently pointed out, and should be placed before the public in its true light whenever opportunities occur. The Committees and Medical Boards who control these proceedings ought to be aware of the probable consequences of reckless parsimony, and the responsibility which rests upon them as the judges between the competitors.

A respectable Druggist who understands his business, and will not sell any drugs but such as he believes to be of good quality, finds himself in this dilemma. He receives a notice to tender for certain medicines. From the character he bears in the locality, he is supposed to be able to supply the institution as well as any member of the trade. He calculates his prices so as to afford a very small per centage of profit—so little, that the order is in itself not worth the time and labour required for executing it; but indirectly it may lead to other business. He cannot afford, or, at all events, he thinks he cannot afford, to sacrifice his position by acknowledging himself incapable of competing with others. He wishes to stand well with the Committee and with the Medical officers, and therefore looks upon the contract as a transaction from which he is content if he should barely cover the cost, and regulates the charges accordingly. To his surprise he finds himself driven out of the field. Another tender is in some of the items 10 or 15 per cent. lower, and the order is given to a neighbour who has recently opened a shop in the town, and, by way of inserting the thin end of the wedge, is determined to secure the business of the dispensary at any sacrifice. If this competition should continue, and other aspirants enter into the struggle, the wholesale Druggists or manufacturers, when calling for orders, are required to assist by reducing their charges, the several candidates for cheap drugs and chemicals must be accommodated; and thus from one step to another the quality goes down to any level to which the cupidity of the Managing Committee may drive it. We are not attempting to justify this reckless competition in the vendors, which is bad policy, and sooner or later recoils back upon themselves. But it is useful in these cases to trace the evil to its source; and this we believe to be the practice of accepting the lowest tender, or purchasing the cheapest medicines, without reference to the character of the party, and with little or no examination of the quality of the samples.

Another correspondent has sent us a pamphlet issued by a company lately established in London, who, taking advantage of the occasional prevalence of excessive competition, adopt the opposite principle, and, denouncing all others, give their own establishment an unexceptionable character, and adopt a scale of prices without reference to competitors. Our correspondent is rather indignant at these sweeping charges against the drug trade in general, founded partly on garbled quotations from a Parliamentary report on adulteration, and shown up in a stronger light by the contrast with the boasted purity and perfection of the advertisers.

Having received the two communications above mentioned on the same day, a comparison was suggested by the coincidence, and while the egotism of self-laudation may be viewed as one of the frailties of human nature, which is the foundation of quackery, the "cutting system" is a still more serious evil, being the primary source of the most disgraceful frauds and adulteration.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *June 3rd,*

Present, Messrs. Ballard, Bell, Bird, Brew, Bucklee, Davenport, Deane, G. Edwards, J. B. Edwards, Hanbury, Meggeson, Moore, Morson, Peacock, Sandford, Smith, Squire, and Waugh,—being the first Meeting after the Anniversary,—the following Officers of the Society were elected :—

JACOB BELL.....*President.*
WILLIAM LIONEL BIRD.....*Vice-President.*
DANIEL BELL HANBURY .....*Treasurer.*
ELIAS BREMRIDGE was also re-appointed *Secretary and Registrar.*

LIST OF MEMBERS, ASSOCIATES, AND APPRENTICES (*continued*).

Elected in June.

MEMBERS.

CARDIFF .....Joy, Francis William
DOVER .....Thornton, John Barber
MALDON .....Wallworth, David
READING .....Heelas, Henry Martyn
WITHAM.....Hayes, James

MAJOR EXAMINATION.

Cornelius, James .....Clapham
Jones, Humphrey.....Chester
Skinner, Henry.....Horncastle
De Valancé, Charles Poupinel .....Mauritius

MINOR EXAMINATION.

Andrew, Leyshon.....Swansea
Cocking, Samuel .....Howden
Fletcher, John .....Camberwell
Jefferson, Thomas.....Cambridge
Madgwick, William B. .....Alresford
Mee, George .....Woolwich
Oliver, John Hamer.....Salop
Scott, Joseph Robinson .....Sheffield

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	TOWNS.
Alderson, Frederick Henry	Mr. Hempsted	St. Leonards-on-Sea
Allan, William	Mr. Carruthers	Dumfries
Appleton, Richard	Mr. Wilson	Sheffield
Bell, William	Mr. Cuthbert.....	Bedford
Hoare, James Roper	Mr. Gigner.....	Chelsea
Lovatt, John Hammond	Mr. Wilshaw	Wordsley
Renaud, Monchery.....	Mr. Deane	Clapham
Seymour, George	Mr. Roose	Oldbury
Stapelton, Thomas Glode.....	Mr. Collins.....	London
Touzeau, James Frederick	Mr. Arnold.....	Guernsey
Touzeau, John Arnold	Mr. Arnold.....	Guernsey
Wood, Albert	Mr. Watkins	Walsall

PHARMACEUTICAL MEETING,

3rd June, 1857.

On Wednesday evening, June 3, a Special Pharmaceutical Meeting was held to consider the provisions of the Sale of Poisons Bill before Parliament,

MR. JACOB BELL, PRESIDENT, IN THE CHAIR.

The Chairman said that the Members of the Society had been called together that evening to consider a subject of great public interest—one involving the health and safety of the public, and the interest and position of the Pharmaceutical Chemists throughout the kingdom. The question how security could be best afforded to the public in the sale and preparation of medicines had been discussed very frequently of late both in the scientific journals and the ordinary newspapers. With reference to the sale of poisons, a Bill had been introduced into the House of Lords, evidently prepared by parties not practically acquainted with the subject, and it was the duty of the Society—consisting as it did of practical men as conversant with the subject as any class, if not more so—to thoroughly consider its provisions, and ascertain if it was a Bill likely to attain the object in view—viz., to promote the safety of the public without needless injury or inconvenience to the profession. The Council of the Society had that day had the provisions of this Bill under their serious consideration. They approached it with a desire of suggesting such amendments as might make it unobjectionable, and at the same time an efficient Bill. The several clauses of the Bill were discussed by them *seriatim*, but as they proceeded they found the difficulty of the subject increased. He should not detain the Meeting by going through the whole of the clauses to elucidate his statement, but only refer to two or three points, on which it was desirable to ascertain the opinion of the Meeting. Now, the Bill in the first instance proposed to repeal the Arsenic Act, which, so far as he was aware, was an unobjectionable Act, although it had not accomplished all that was expected from it. It then enumerated a class of medicines known as poisons that should be kept under lock and key, which would seriously inconvenience Chemists, because they comprised a large class of preparations in every-day use, so that Chemists would be obliged to keep a considerable portion of their stock under lock and key in a manner that every one acquainted with the profession knew to be impracticable. The difficulty attending the provision, restricting the sale of poisons to persons of full age in the presence of a person of full age, or on the production of a certificate, signed by the clergyman of the parish or district, or a legally qualified practitioner, or a justice of the peace, had been pointed out in the *Times*, the *Lancet*, and other journals, in a manner that admitted of no answer. It was truly absurd to suppose that a person should not supply a mixture containing antimonial wine or a few drops of laudanum in cases of emergency without these formalities being complied with, and, moreover, the Act made no distinction between properly-qualified Pharmaceutists and the country tradesman, who sold in one corner of his shop drugs of the nature of which he was totally ignorant. The Bill proposed a variety of conditions to be complied with on every sale of poison, which they, as a body, knew to be next to impossible to fulfil; and should a Chemist happen accidentally to transgress any one of these provisions of the Act, he would be liable to a penalty of £20 for the first offence, and for a second to be disabled from carrying on his business hereafter, the effect of which provision would be, if carried out, to shut up every Druggist's shop in the kingdom within six months. The 11th clause proposed to exempt from the operations of the Act persons "carrying on the trade or business of painters, manufacturers of, and dealers in colours, artists' colourmen, glass or shot manufacturers, veterinary surgeons, dyers, paper-stainers, electro-platers, photographers, braziers, whitesmiths, bird-stuffers, or firework-makers, provided the poison is stated to be required, and may be reasonably believed to be required, for the ordinary purposes of trade or lawful occupation, and not for any other purpose whatsoever;" so that any criminal poisoner wishing to obtain poison by assuming to belong to any one of these trades would be able to evade the Act, and obtain any poison he required, whilst the qualified Chemist was not recognized by the Act, and would be obliged to submit to the proposed vexatious restrictions. The provision requiring the sale of medicines in square bottles of a particular coloured glass, with the word "Poison" moulded on them, was one of those visionary ideas it was curious to see in print, and he had published the Bill entire in last month's Journal, as

it would be a literary curiosity to be referred to in future. The proposal to colour all poisons with archil, soot, or indigo, was a scheme which no person practically acquainted with the profession of a Chemist would fall into. It was well known by Chemists that some poisons would alter or destroy the colour of the archil, and that it would be useless to add a colour for distinction which the poison would destroy; whilst, on the other hand, the addition of colour to other poisons would render them useless for most of the purposes for which they were required. Oxalic acid was used for straw-bonnet bleaching, cleaning of boot-tops, &c.; but upon the representation of the person giving the certificate that the coloured poison would be unfit for the purpose, he might be supplied with it colourless in quantities not less than half a pound. Supposing an ounce of oxalic acid to be wanted, he would have seven ounces over, which being put away on a shelf, might cause serious accidents by being mistaken for Epsom salts. That was only one instance amongst others that might be mentioned, if this provision was enforced, that would make the evil worse than at present. This Bill, if passed into a law, would place odious and objectionable restrictions on properly-qualified Chemists, and be the means of throwing the trade into the hand of ignorant persons, and at the same time oblige purchasers to buy larger quantities of poison than they required. As the Council had requested an interview with Lord Granville, who had charge of the Bill, to point out to him their objections to it, he (the Chairman) should be happy to hear the opinions of Members on the subject, and he had no doubt the deputation, as practical men, would be able to give his Lordship better information than those who had assisted him in framing this extraordinary Bill.

Mr. Collins asked if the Council who had had more time probably to study the provision of the Bill than the Members, and were thereby better acquainted with its objectionable parts, had any suggestions to make to the meeting as to the best course to be pursued.

The Chairman replied, that resolutions would be submitted for the consideration of the Meeting, the first of which he read as follows:—"That the Bill now before the House of Lords, intituled 'An Act to Restrict and Regulate the Sale of Poisons,' is not calculated to effect the object for which it is professedly introduced; that it would prove no protection to the public, but, on the contrary, greatly augment existing evils, and also throw needless obstacles on the legitimate sale of useful and necessary medicines." The object of the Council was to obtain the unbiassed opinion of the Meeting on the provisions of the Bill. He was sure they intended no factious opposition to the Bill, which had been introduced professedly for a good object.

Mr. Collins agreed with the Chairman that it was desirable for the Society to express its opinion on this Bill; that a deputation lay it before the Lord President, but then they would be in the position that if the Lord President called on them for a substitute, they would have nothing practical to offer to him. He agreed that the sale of poisons should be restricted, but not in the manner proposed by this Bill, and he asked how Chemists were to guard against the mistakes made by persons coming for drugs? Precipitate powder was a common thing to be sold to children sent by their mothers for it, and he had heard of an instance from a gentleman in the room, of a child when sent for a Seidlitz powder, corrupting it to precipitate powder, and being served with it. The Chairman had forcibly pointed out that it was impossible to carry out the provisions of this Bill. Mr. Collins then referred to the clause compelling persons to buy half a pound of poison, and to the penalties for an infringement of the law. He thought the proposed regulations would not work well. In the first place, the Bill should define poisons, and then place their sale under properly qualified persons. He would have no objection to the law prohibiting assistants and apprentices selling them, and that a penalty should attach to their selling them to children of tender age.

The Chairman considered it would be better to confine the discussion to the question whether it was a desirable Bill to pass or not. After they had disposed of that question, they could discuss its details.

Mr. Deane moved the first resolution:—

"That the Bill now before the House of Lords, intituled 'An Act to Restrict and Regulate the Sale of Poisons,' is not calculated to effect the object for which it is professedly introduced; that it would prove no protection to the public, but, on the contrary, greatly augment existing evils, and also throw needless obstacles on the legitimate sale of useful and necessary medicines."

He called attention to the 11th section of the Bill, by which the evil proposed to be remedied would, he thought, be greatly aggravated, by taking the sale of poisons from responsible and qualified persons, and placing it in the hands of oil and colourmen and others, who were ignorant of their nature. He also thought it would be impossible for the most conscientious to carry out the provisions of this Bill, and they would be in danger, if a sufficient number of informers could be found, of having all their shops shut up within a month after the Act came into operation.

Mr. SLIPPER seconded the motion. Many objections could be raised to the sale of poisons, and all must admit that it was desirable that they should submit to some regulation respecting it. To effect that in the least objectionable way, the Government ought to examine practical men before a committee, but at present he believed no such person had been consulted on the question. He quite concurred in the opinion expressed, that if this Bill were carried into a law, it would aggravate the evils complained of, because it would increase the sale of poisons to a larger extent than now existed, to persons who would not feel that responsibility attaching to them that Pharmaceutical Chemists did. He also expressed an opinion as to the hardship it would be to workmen, as well as the increased possibility of accidents arising from compelling them to purchase a larger quantity of many poisons than they required.

The resolution was then put to the Meeting, and carried unanimously.

The CHAIRMAN said that he hoped the efforts they were about to make would have the desired effect of introducing such modifications into the Bill as would remove its objectionable features, or else the withdrawal of this measure and the introduction of a more judicious one. The subject, unfortunately, was one that was not generally understood by the members of the Legislature, and he assured the meeting that it was very difficult to induce Members of Parliament to enter with any degree of interest into such a subject, and it was just possible that the public feeling having strongly set in against the supposed danger arising from free trade in poisons, that a Bill of this kind might be passed through some of its stages without that mature consideration that the question required. It was therefore necessary for them to be prepared to take such steps as the emergency of the case might demand, and in the event of the Bill making further progress, it would be desirable to call a special general meeting of the Society.

Mr. COLLINS moved the second resolution :—

"That in the event of the Bill making any further progress, it is desirable that a Special General Meeting of the Pharmaceutical Society be convened, and that the local Secretaries be communicated with on the subject, with a view of offering the most strenuous opposition to such a measure."

Dr. EDWARDS said that the Pharmaceutical Chemists of Liverpool considered the Bill in its present form highly objectionable, and that they intended to hold a Meeting on the following evening on the subject. In addition to the disadvantages of the measure already pointed out, he observed that there was an increasing desire on the part of the public for chemical studies, and they were being introduced very generally into schools. The passing of the Bill in its present form would materially check them, because many of the articles required could not be sold to youths for the prosecution of those studies, and this inconvenience would especially apply to photography. If the sale of these articles was only entrusted to properly-qualified Pharmaceutical Chemists, as he thought they ought, they would be able to exercise discretion as to the parties to whom poisonous chemicals should be supplied, without any legislative enactment. A qualified Pharmaceutical Chemist did not seek to obtain his livelihood by poisoning his customers, but by watching and taking care that those substances did not get into improper hands.

Mr. PEDLER urged caution in their proceedings, and advised them not to offer a decided opposition to the whole of the Bill, but only to its objectionable parts. He thought that the deputation should wait upon Lord Campbell as well as Lord Granville, and state their case fairly to that noble Lord, who no doubt would give them every assistance. He (Mr. Pedler) would be happy to assist the Government in bringing in a measure and carrying it out that would prevent too great a familiarity with the use of poisons by the public, and therefore he thought a measure similar to the Arsenic Act desirable. Now was the time for the Pharmaceutical Chemists to call upon the Government to assist them by extending their powers as a body, who, by their knowledge and improved chemical education, would be enabled to

assist the Government in return in reference to the sale of poisons, and he felt satisfied that then the Government and the public would have no cause to complain.

Mr. ORRIDGE considered that making a positive distinction between Chemists and oil and colourmen would be an arbitrary proceeding, and would inflict injury on many country Chemists, who, from necessity and the requirements of the neighbourhood, were compelled to keep oils, colours, and dry saltery goods in their shops.

The CHAIRMAN explained that the distinction would not affect them, but grocers, oilmen, &c., who kept drugs in their shops of the nature of which they were totally ignorant.

Professor ROGERS said that for the last seventeen years he had examined nearly all the cases of poisoning that had occurred in a large district of Westminster, and his experience enabled him to say that the provisions of this Bill would not have prevented the occurrence of one of them. As the *Times* had stated, it was to the growing intelligence of Chemists, and to the discretion that they would use in the sale of poisons, that the Government must look for a remedy of the evil. The Bill was intended to prevent criminal poisoning, but he thought it would rather protect such persons than otherwise. The great protection against criminal poisoning was not to be found so much in restricting the sale of poisons as in having strict examination of the cause of every case of suspicious or sudden death.

Mr. BUCKLEE considered the Society should appoint a deputation to wait on the Government, and point out to them the absurdities of the Bill, both with regard to the articles in the schedule and the use of particular bottles. Then, as regarded the sale of poisons, he thought it would be almost impossible in London to find a person known to the seller and purchaser of the poison, which might be of the greatest consequence where articles considered poisons were required in an emergency. He suggested with regard to the use of bottles, &c., for the detection of poison, that the distinction should be in the Chemist's shop, and not in the form or colour of the bottle or article supplied to the customer.

Mr. BREWER called attention to the practice adopted in Germany and other places on the Continent relative to the sale of poisons. There, if a Pharmaceutical Chemist poisoned a patient by accident, he was not only fined, but imprisoned.

The CHAIRMAN said that there were restrictions against the sale of poisons in some countries. In Prussia, a Chemist was not permitted to sell poisons without a prescription from a medical man. In those countries the people did not take physic like the English. There they only took it when prescribed by a medical man ; but here a great quantity was taken without such prescription, and hence the difficulty of imposing such restriction.

Mr. MORSON said that the number of persons poisoned in this country by design or accident was very small, in comparison with the population and the amount of medicine prescribed, made up, and taken by the public ; and with regard to poisoning by design, it was impossible to prevent it by legislative enactment. He asserted with great confidence that the more respectable Chemists and Druggists of this country exercised great caution in the sale of poisons, and few would supply prussic acid or laudanum to a child or an anxious-looking female, or to any person, without making strict inquiries. Improving the status of those employed in Chemists' shops, and preventing apprentices from indiscriminately selling poison without consulting their masters, would in a great measure prevent what the Government was very properly anxious to restrain. It was extremely dangerous for the public that open discussions should take place on the subject of poisons, but they ought to be informed that all poisons were capable of detection. The Government had no doubt introduced this measure to gratify the public desire that something should be done to prevent poisoning. It would, however, be utterly impossible for any legislative enactment to prevent persons from committing evil acts ; and it should be borne in mind that most of the criminal poisonings were accomplished by skilled persons. Most of the poisons could be detected by the taste, such as strychnia, and therefore it required the ingenuity of clever men to disguise their presence in the administration.

Professor REDWOOD said that the Meeting appeared to be pretty unanimous in thinking that this Bill had originated from a good motive—viz., to dispel the feeling of alarm that prevailed at present in the mind of the public ; but at the same time it was their duty to guard against infringing unnecessarily upon the conveniences and necessities of that public. A large portion of the public no doubt felt that it was

desirable for something to be done towards lessening, if possible, the number of accidents that occurred through the sale and use of poisons. A number of practical men connected with the Council had examined this Bill, and they had come to the conclusion (which he believed was participated in by the Pharmaceutical Chemists of the country) that the framers of it had committed a great error in attempting too much. There were a certain number of poisonous substances very generally used by the public for legitimate purposes. They were sold to a large extent by dealers, some of whom were well acquainted with their nature and effects, whilst others were ignorant of them—that was to say, they were not acquainted with the conditions under which fatal accidents might occur with them. There were other poisonous substances of a more subtle nature, which the public rarely, if ever, required, excepting as prescribed medicines. Therefore, the first point that should have occurred to the promoters of the Bill should have been classification—those poisons generally in use, such as laudanum, oxalic acid, essential oil of almonds, and a few others, would form the first class; and those poisonous substances that were rarely used by the public, such as the vegetable alkaloids and prussic acid, would form a separate class. Another great point for the consideration of the promoters of the Bill should have been how to restrict the sale, which was to be accomplished by restricting the number of persons allowed to sell them as far as the public convenience and advantage would admit of. He did not think the same restrictions should be applied to the first class he had named as to the second, which were rarely used, and only ought to be used under the supervision of Medical or qualified men. It appeared to be the impression of the Meeting that the sale of poisons should be under restrictions, and he considered that a graduated scale, so to speak, might be adopted to apply more stringently to the rarely used poisons than to the others. He concurred in the propriety of limiting the sale of these substances. The first class he would confine to Druggists and Pharmaceutical Chemists, and the second to the Medical Profession and Pharmaceutical Chemists, men who, from their education and qualifications, would be well acquainted with their nature and effects. By that means they would get rid of the difficulty which this Bill, if carried into a law, would raise relative to a person taken suddenly ill, and requiring a dose of medicine, having to go through the inconvenient formalities there pointed out before he could get relief. The object of the Society ought to be to endeavour to devise something that would meet the requirements of Government and the public.

After some further remarks from Mr. Collins, the resolution was unanimously agreed to.

The Chairman said, that if the Meeting would leave the subject in the hands of the Council they would pay every attention to it, and the result should be published in due course in the Transactions of the Society; but if anything urgent should occur, the Members would be speedily informed.

DEPUTATION TO LORD GRANVILLE.

On Friday, the 6th of June, the Deputation, consisting of Messrs. Bell, Bird, Squire, Morson, Deane, Waugh, and Meggeson, with the Secretary, had the honour of an interview with Lord Granville at the Council Office, Whitehall, on the subject of the Bill for Regulating and Restricting the Sale of Poisons.

Mr. Bell commenced by stating, that it was not the object of the Deputation to obstruct legislation, or to oppose any restrictions which might be conducive to the welfare and safety of the public, but rather, to assist by suggestions founded on practical experience. The Pharmaceutical Society had been endeavouring for many years to impress upon the Legislature the danger arising to the public from the free trade in poisons by ignorant persons; this had been a prominent feature in their petitions to Parliament, of which he read an extract, dated 1847, being one among the numerous petitions in favour of the Pharmacy Bill. The subject at that time excited very little interest, but the traffic in poisons by uneducated persons was the chief source of danger. The qualified Chemists, understanding the nature of these substances, and knowing how accidents were likely to occur, took such precautions as their experience suggested, for their own security as well as that of their customers; for they

dreaded nothing so much as having their names connected with any accident, and a penalty of £20 or £50 was a matter quite insignificant compared with such weight of responsibility. No Act of Parliament could make them more careful than they were obliged to be for their own reputation. With persons totally ignorant of the nature of poisons and their effects, the case was different; yet the Bill now before the House of Lords recognized no distinction in favour of qualified Pharmaceutical Chemists; on the contrary, while it subjected them to extremely inconvenient, and in fact impracticable restrictions, a number of non-professional trades were exempted by the 11th section from its operation. The schedule of poisons contained many medicines in daily use, among others, tartar emetic, a common remedy required at a moment's notice in cases of poisoning, but before the needful certificates could be obtained, the patient might be in a hopeless state. Other medicines were also often required on an emergency. The second section repealed the Arsenic Act, which, although a partial measure, had done some good, by increasing the difficulty of obtaining arsenic by retail, but this measure was substantially re-enacted, many substances being included to which its provisions, especially that of colouring with soot or indigo, were quite inapplicable.

Lord Granville inquired to which substances this remark applied.

Mr. Bell mentioned oxalic acid, which is used for scarcely any other purpose than that of bleaching leather, straw bonnets, &c.; also corrosive sublimate, the vegetable alkaloids, cyanides of potassium, &c.; chloride of zinc, tartar emetic, and some others.

His Lordship put some searching questions tending towards the inference that the plan of colouring poisons might, as a general rule, be a good precaution, and that any inconvenience attending it would be met by the proviso in the 8th and 9th sections;

But several of the Deputation expressed a decided opinion that the cases to which the plan would in practice be applicable would be rare exceptions, such as the sale of arsenic and a few other poisons for killing vermin or for some agricultural purposes; and that the provision that certain poisons might only be sold uncoloured in quantities not less than half a pound would greatly increase the danger, by obliging persons to buy more than they wanted. The impracticability of keeping all the scheduled poisons under lock and key was pointed out, and it was stated that this would not prevent accidents, such, for example, as the one in the papers of yesterday, in which arsenic was sold instead of white lead. The Deputation objected to the regulation respecting the colour and shape of the bottles as being also impracticable as an absolute rule, although coloured bottles were sometimes used for convenience,—for example, when a draught and a liniment were ordered in the same prescription, the latter being in a blue bottle was more readily distinguished; but this was not intended to supersede the universal and much more important precaution of distinct labels, and a careful attention to the labels by patients.

His Lordship did not see the force of the objection—observing that the use of blue bottles, as admitted by the Deputation, was a refutation of the argument, and that the entire plan had been adopted in Ireland.

Mr. Squire read an extract from a letter of a correspondent in Dublin, stating that the Society of Apothecaries had repudiated the order of the College of Physicians in reference to the round and square bottles, and that it was, in fact, a dead letter.

The Deputation adverted to the complicated nature of the system of entries in the sixth section, which, considering the long list of medicines in schedule A, and the probability of additions by Her Majesty in Council, would, in their opinion, be quite incompatible with the regular and proper despatch of business;—and they remonstrated against the severity of the provision disabling a person, after a second offence, from carrying on the business of a Chemist and Druggist.

Mr. Waugh adverted to the regular use of domestic remedies by all classes, and the supply of such remedies by Pharmaceutical Chemists, which would be unnecessarily interfered with to the inconvenience and sometimes injury of the public by the proposed restrictions. He also directed attention to the efforts the Society had been making for a series of years to improve Pharmaceutical education, and at a considerable annual expenditure to send forth for the benefit of the public a supply of qualified and intelligent dispensers of medicine.

Mr. Meggeson observed that the provisions of the Bill would operate more inconveniently and injuriously in the country than in the metropolis; and in passing a measure of that nature having a general operation, it was necessary to take into consideration the circumstances and requirements of different localities.

Lord Granville observed that the tenor of the criticisms of the Deputation was inconsistent with the introductory remark of Mr. Bell, as it appeared that they objected to the Bill *in toto*, and had offered no suggestions for its amendment. It also appeared that they had in their own practice anticipated the Legislature in reference to some of the precautions, and yet they objected to the general enforcement of the same by Act of Parliament.

Mr. Bell said the Council of the Pharmaceutical Society had entered upon the consideration of the Bill with an anxious desire to suggest improvements, and reduce it to a practicable form. They had done the same when the Arsenic Bill was introduced, and had pruned it very considerably from the state in which it was originally drawn. In the present instance they had found the task much more difficult, and after a deliberation of several hours, had been compelled to arrive at the conclusion which had been stated.

His Lordship said he had every reason to believe that the members of the Deputation, and indeed the qualified Chemists generally, adopted proper precautions in reference to poisons; yet it was notorious that accidents and crimes frequently occurred, and it was desirable to find a remedy.

In answer to the question, whether they had a specific proposition to offer, Mr. Bell said they were not prepared with the details of any measure; but understanding that the Bill was about to be referred to a Committee, they would be glad to be examined on the subject, and would afford as much information as their experience enabled them to do. It was their decided opinion that the too general and public discussion of the subject was calculated to do mischief, by promulgating a kind of knowledge which would facilitate the commission of crime.

Mr. Morson observed that no Act of Parliament could prevent criminal poisoning altogether. The chief security against it was the general belief in the certainty of detection, and the suppression of information as to the various modes in which the crime might be committed with impunity. The safety of the public depended more upon the character and intelligence of the vendors of poison, than on any restrictions that could be devised for the guidance of persons who, from their want of education, were not fit to be trusted with such agents.

Lord Granville said he gathered from these remarks that the Deputation recommended a system of registration and licensing for dealers in poison.

Mr. Bell replied that this had been the principle always advocated by the Society; that the Pharmacy Act, as originally drawn, provided for the registration of all the Chemists and Druggists of that date, and for the examination of all who should in future enter the business; but the Select Committee of the House of Commons cut down the Bill, insisting upon absolute free trade in medicines, including poisons, and merely conferring an honorary distinction on those who might voluntarily comply with the regulations of the Society by qualifying themselves.

In what manner, then, his Lordship inquired, did the Deputation recommend that this should be carried out?

Mr. Bell suggested that a register might be opened for all Druggists now in business, under the name of "Registered Druggists," with the proviso, that as this class die out no others should be added, but that in future all should be Pharmaceutical Chemists, as provided by the Pharmacy Act.

Lord Granville asked Mr. Bell how he could expect the Legislature to introduce a system which, in his own experience in the House of Commons, he had found to be so unpalatable?

Mr. Bell said a revolution had taken place in public opinion. At that time the utmost apathy and indifference prevailed on the subject. The usual answer to every proposition was "*caveat emptor*," and it was a difficult task to induce the House of Commons to listen, even for a quarter of an hour, to any discussion relating to medicine. He was obliged to go into Parliament himself to take charge of the Pharmacy Bill, because no one would entertain it or take the slightest interest in the subject. Since that time a Committee of the House had published a report on the adulteration of drugs and food, and several cases of poisoning had caused considerable excitement. The Legislature now seemed to be going from one extreme to the other—from the extreme of apathy to a panic no less extravagant. The public must now be protected by the most ingenious contrivances, treated like children, and relieved from the trouble of reading labels; the dangers which had been pointed out by the Pharmaceutical Society sixteen years ago, and then unheeded, were now not only admitted, but even exaggerated. The wind having changed, it was time to hoist a sail. While the wind was in their teeth it was useless to struggle against it, and they took what they could get as an instalment of the measure which the safety of the public required. It was obvious that no legislation on the subject of poisons could be effectual which ignored the qualification of the vendors, and, while imposing vexatious restrictions on educated Pharmaceutical Chemists, permitted the unlimited sale and dispensing of medicines by ignorant persons in any chandler's shop in the kingdom.

Lord Granville expressed his surprise at the strong objections which had been urged against the proposed restrictions, while a much more stringent system prevailed, and was found practicable, in some nations on the Continent.

It was observed, in reply, that the public in this country are much more addicted to taking physic than on the Continent; and

Mr. Bell remarked that the Pharmaceutists and Apothecaries in those countries were regularly educated and protected—competition with general shopkeepers did not exist—and in some localities the number of Pharmaciens was limited according to the population. If the example of the Continent was to be followed in one respect, it should not be disregarded in the other.

In conclusion, the Deputation expressed a desire to afford any assistance in their power in the consideration of this important and difficult subject; and Lord Granville thanked them for the practical information they had given.

THE COMMITTEE OF THE HOUSE OF LORDS ON THE POISON BILL.

On Monday, June 8th, a communication was received from the House of Lords, summoning two members of the Deputation to attend the Committee, on that or the following afternoon. At a meeting of the Deputation, held at the house of the Society, two members were appointed to give evidence, and proceeded, on Tuesday afternoon, June 9th, to the House of Lords; the other members of the Deputation having requested to be present, permission was granted.

The Committee adjourned to Friday afternoon, June 12th, when the examination was resumed.

During the interval, the Deputation having more minutely revised the clauses of the Bill with a view of reducing the objections to a tangible form, prepared a

copy of it, with such alterations and erasures as they considered desirable, and handed the same to the Committee on the second day of their examination.

The Report of the Committee not having been presented to the House of Lords, we are not authorized to publish any portion of the evidence, or to give an outline of what transpired on the occasion.

It is proper, however, to state, that the Deputation were received with much courtesy, and with a very evident desire on the part of their Lordships to obtain practical information on every branch of the subject, and to solve the difficult problem of affording to the public that protection which the urgency of the case seemed in their judgment to demand, without causing needless inconvenience to Pharmaceutical Chemists, or interfering improperly with general trade. The Deputation stated that they could not hold themselves responsible for the opinions which Chemists in various parts of the country might entertain on the merits of the forthcoming Bill; which, however, would have the serious attention of the Society, with a view of affording assistance, and not from any disposition to factious opposition.

On Monday afternoon, June 15th, Messrs. Abraham and J. B. Edwards attended the adjourned Committee of the House of Lords as a deputation from the Liverpool Chemists' Association. On the same day, a copy of a Bill with suggested amendments, which had been received from Mr. Macfarlane on behalf of the North British Branch of the Society, was handed to Lord Granville.

The Committee adjourned until Tuesday, the 16th of June, and has continued its sittings.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

Royal Institution, Thursday, 21st May, 1857.

THE PRESIDENT, MR. ABRAHAM, IN THE CHAIR.

The Secretary announced donations to the Museum from D. Bigg, Esq., and Mr. H. S. Evans.

The President read a letter he had received from Dr. Medlock, on the subject of his patent for purifying water by means of suspended coils of iron wire, and with especial reference to some remarks made by Dr. Edwards at the last meeting, in his report on the Rivington water.

Dr. Edwards detailed some further experiments he had made on Dr. Medlock's patent, and stated that he had not been successful in removing the colouring matter of the Rivington water by its application.

Considerable discussion, but possessing only a local interest, followed Dr. Edwards' remarks.

The President called the attention of the meeting to an abstract of a Bill for restricting and regulating the sale of poisons, read the previous day for the first time in the House of Lords.

After a few remarks from several Members present, its further discussion was adjourned to the next meeting.

Thursday, 4th June, 1857.

THE PRESIDENT IN THE CHAIR.

Mr. Jos. Denson was elected a Member of the Association.

The Secretary announced donations to the Library and Museum from T. Bickerton, Esq.

A paper by Mr. T. D. Walker, the Librarian, on "The Library," was read by the Secretary.

The Chairman then introduced the subject of the Sale of Poisons Bill, and detailed to the meeting its principal provisions.

It was moved by Dr. Edwards, seconded by Mr. Sumner, and carried unani-

mously,—"That in the opinion of this meeting, the Bill introduced into the House of Lords, to restrict and regulate the sale of poisons, is not calculated to effect the purposes intended, but seriously to interfere with the requirements and interests of the public."

Moved by Mr. H. SUGDEN EVANS, seconded by Mr. J. DUTTON, and carried unanimously,—"That the Council be authorized to draw up and present a petition on behalf of this Association, to the House of Lords, stating the grounds of objection to the Bill, and urging its rejection."

Thursday, 18*th June*, 1857.

THE PRESIDENT IN THE CHAIR.

The SECRETARY announced donations to the Library from Messrs. T. D. Walker, R. A. Tudor, J. B. Nevins, J. B. Edwards, and himself.

The CHAIRMAN made a statement of the steps taken by the Council, with respect to the Sale of Poisons Bill, since the last meeting. In accordance with the resolution then passed, a petition, which the Secretary would read, had been drawn up, and forwarded to Lord Derby for presentation to the House of Lords. Lord Derby, in acknowledging the receipt of the petition, stated that the Bill had been referred to a Select Committee, who, he had no doubt, would be willing to hear evidence from a deputation of the Association in support of the petition. Acting upon this suggestion, the Council, after due consideration, determined upon sending a deputation, consisting of Dr. Edwards, Mr. Mercer, and himself, to give evidence on the subject. Mr. Mercer was unable to leave, but Dr. Edwards and himself had attended before the Committee, and were very courteously received. The evidence would not be made public until the Committee had decided upon their report. All the members of the Committee appeared thoroughly aware of the difficulty of regulating the sale of poisons by legislation, and were extremely desirous of obtaining as much information as they possibly could, so that a practicable and useful Bill might be drawn up.

The SECRETARY then read the petition which had been presented to the House of Lords :—

To the Right Hon. the Lords Spiritual and Temporal of the United Kingdom of Great Britain and Ireland, in Parliament assembled.

The Petition of the Liverpool Chemists' Association

Humbly showeth,—That your petitioners have seen a copy of a Bill now under the consideration of your Lordships' House for restricting and regulating the Sale of Poisons.

Your petitioners acknowledge that it is most desirable to prevent poisonous substances falling into untrustworthy hands, whereby life may be endangered through crime or mistake; but they humbly submit that the Legislature can do nothing towards the attainment of this object, unless the sale of such substances be confined to respectable and competent persons.

Your petitioners respectfully submit that such a class exists in the Pharmaceutical Chemists of Great Britain, registered under Act 15 and 16 Victoria, cap. 56, and in many Chemists and Druggists; but they desire to point out to your Lordships that there is no class of "Licensed Druggists" in this country, although such a name appears in the Bill before your Lordships' House.

Your petitioners are of opinion that the provisions of this Bill would have a strong tendency to throw the supply of poisonous substances, especially those used by the poorer classes, into the hands of the lowest class of dealers, who would evade its requirements, it being remembered that any person may assume the name and follow the calling of a Chemist and Druggist.

Your petitioners beg to represent that the 4th clause of the Bill, providing for additions to schedule A, would not secure that publicity and due consideration which should be afforded in cases where exceedingly severe penalties are enacted, more especially as there are a large number of substances which may be considered poisonous; and they therefore submit that no addition to the schedule should be made without the sanction of Parliament, otherwise much confusion and frequent unintentional breaches of the Act will ensue.

Your petitioners are of opinion that the difficulties thrown in the way of obtaining poisons for legitimate purposes by clauses 5 and 6 would result in their constant evasion, and humbly pray that your Lordships will take evidence on this point;

and further, that clauses 7, 8, and 9, instead of being a protection to the public, would have a directly contrary effect, and that clause 11 should include all sales for purposes of business.

Your petitioners are also of opinion that the provisions of this Bill are of such a character, that many persons desirous of paying the utmost obedience to the law may be betrayed into a breach of them by oversight, or by the indiscretion of an assistant, and therefore your petitioners humbly submit that the penalties, especially for a second offence, are cruel and severe.

Your petitioners humbly represent that many of the articles in schedule A are in daily demand for domestic and useful purposes, probably to the extent of millions of sales annually in this town and neighbourhood; and they are also very often required instantly for the relief of urgent suffering; and to restrict the sale of such would impose a serious inconvenience on the public without defeating the objects of the criminal.

Your petitioners therefore, taking these premises into consideration, humbly request your Lordships to reject the Bill.

Signed on behalf and by the direction of the Liverpool Chemists' Association,

JOHN ABRAHAM, President.

Dr. EDWARDS and other Members made some observations, after which

Mr. MERCER placed before the Meeting some specimens of parchment paper, the process for making which had been patented, and described in the last number of the Journal. He said he did not think the patent could be sustained, as a similar process for making the same article under the name of "papyrine" was described in Beasley's *Druggists' Receipt Book*, published in 1850, p. 345.

The CHAIRMAN informed the Members that this was the last Meeting of their eighth session, and that they consequently would not be called together again until the Annual Meeting, which would be held on the last Thursday of September.

ORIGINAL AND EXTRACTED ARTICLES.

EXAMINATION OF JAPANESE PEPPER, THE FRUIT OF THE XANTHOXYLUM PIPERITUM OF DE CANDOLLE.

BY JOHN STENHOUSE, L.L.D., F.R.S.

ABOUT three years ago, I published a cursory examination of Japanese pepper, and described a crystalline principle, to which I gave the name of Xanthoxylin, made with a specimen received from my friend Daniel Hanbury, jun., Esq. Having recently obtained a larger quantity of the same material, I was enabled to submit it to a more extended examination.

"Japanese pepper is the produce of *Xanthoxylum piperitum*, *De Cand.* (*Fagara piperita*, *Linn.*), a tree of Japan of the natural order Rutacæ, figured and described by Kœmpfer, in 1712.*

"It consists of roundish sessile capsules of the size of a peppercorn, which appear to have been normally four in number, situated at the extremity of a peduncle, though but one or two are usually fully developed. The capsules, which are externally reddish brown, have their outer covering beset with numerous prominent tubercles, enclosing an acrid liquid, to which the pepper owes its pungent flavour. The seeds are black, shining, and devoid of pungency; from dehiscence of the capsules, they are generally wanting in the sample which we have examined.

"The flavour of Japanese pepper is aromatic and agreeable, with a pungency not unlike that of pellitory (*Radix pyrethri*). Its odour when bruised is remarkably fragrant.

"It is employed as a condiment by the Japanese and Chinese."

The seeds after being crushed in a mortar were distilled with water. The distillate consisted of water, containing a mixture of an oil and a crystalline solid body (Xanthoxylin) floating on its surface.

The oil and stearopten, having been removed from the water, was strongly

* *Amœnitates*, pp. 892—895.

cooled, when the greater portion of the stearopten crystallized out, and was separated from the oil by filtration.

The Oil.—When the oil was submitted to fractional crystallization, the greater portion came over at about 130° C., and was found to be free from stearopten. The portion remaining in the retort was transferred to a beaker, loosely covered by a piece of filter paper, and allowed to stand for several weeks, when a quantity of stearopten deposited. The crude oil boiling at 130° C., was well shaken and allowed to stand in contact with fused chloride of calcium to remove adhering moisture, then distilled off caustic potash, and afterwards rendered quite pure by being rectified off sodium and a small quantity of potassium.

The oil after having been purified in the manner above detailed had a constant boiling point of 162° C.

When burnt with oxide of copper in the gas furnace :

I. 0.192 grms. of oil gave 0.198 grms. of water, and 0.62 grms. of carbonic acid.

II. 0.191 grms. of oil gave 0.199 grms. of water, and 0.623 grms. of carbonic acid.

THEORY.		EXPERIMENT.	
		I.	II.
C_{10} = 60 —	88.23	88.00	88.02
H_8 = 8 —	11.77	11.45	11.62
68	100.00		

From the above numerical results, it is evident that the oil is a hydrocarbon isomeric with oil of turpentine. The pure hydrocarbon, to which I propose to give the name of Xanthoxylene, is colourless, refracts light strongly, retains its original extremely pleasant aromatic odour even after repeated rectifications, and does not undergo the alteration of odour which is usually exhibited by hydrocarbons obtained by the distillation of the essential oils after treatment with sodium.* On saturating the oil with dry hydrochloric acid gas, and allowing it to stand for many days, no crystalline body was obtained, but a liquid combination with hydrochloric acid was evidently produced.

The Stearopten.—The crystalline body, or stearopten, which deposited on the surface of the water obtained by distilling the seeds with that liquid, which was also produced by the spontaneous evaporation of the crude oil boiling above 130° C., was purified by repeated crystallizations out of alcohol. The stearopten thus purified, presented the form of large crystals of a fine silky lustre, and when analysed, gave the following results :—

I. 0.2135 grms. gave 0.118 grms. of water, and 0.477 grms. of carbonic acid.
II. 0.252 grms. gave 0.139 grms. of water, and 0.563 grms. of carbonic acid.
III. 0.332 grms. gave 0.184 grms. of water, and 0.748 grms. of carbonic acid.

THEORY.		EXPERIMENT.				
		I	II.	III.	IV.	V.
C_{40} = 60 —	61.22	60.88	60.91	61.11	61.09	61.09
H_6 = 6 —	6.12	6.31	6.11	6.00	6.45	6.80
O_4 = 32 —	32.66	—	—	—	—	—
98 —	100.00	—	—	—	—	—

* The pleasant aromatic odour of Japanese pepper is due to Xanthoxylene.

The stearopten is insoluble in water, but readily soluble in alcohol and in ether. When quite pure, it possesses a very slight odour resembling that of stearine, and its taste is slightly aromatic. It distils unchanged, the melting point before and after distillation being the same, namely, 80° C., and its solidifying point 78° C. An alcoholic solution of the stearopten added to alcoholic solutions of nitrate of silver and acetate of lead, even on the addition of ammonia, gave no precipitate—nitric acid converts the stearopten into oxalic acid.

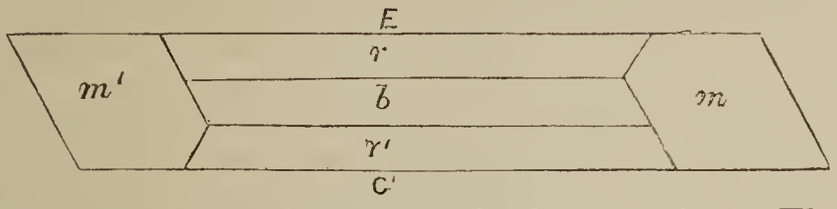
In my former notice of Xanthoxylin, which, from the very small quantity at my command, I had endeavoured to purify from adhering resin by washing it with ammonia, I found a minute trace of nitrogen no doubt arising from the small quantity of ammonia adhering to the crystals.

When Xanthoxylin is perfectly pure, however, it is entirely devoid of nitrogen.

Through the kindness of Professor W. H. Miller, of Cambridge, I am enabled to subjoin the following figure and description of the crystalline form of Xanthoxylin :—

"The angles between normals to the faces, are :—

b c	90°	0′
r b	37°	10′
r c	52°	50′
m b	58°	50′
m c	83°	30′



"Cleavage. *b*, very perfect and easily obtained ; *c*, perfect. The crystals are extremely thin in a direction perpendicular to the face *c*.

"The faces *r m* were so imperfect, that the angles they make with *b* and *c* could not be determined with much accuracy."

ON THE DETECTION OF STRYCHNINE.*

BY STEVENSON MACADAM, PH.D., F.R.S.E.,

Lecturer on Chemistry in the Medical School, Surgeons' Hall ; to the School of Arts; and to the Pharmaceutical Society of Great Britain.

For some time back the tenants on the Kinnoull estates in the neighbourhood of Perth have suffered severely from the loss of their well-trained sheep-dogs, which were supposed to be destroyed by poison. At the latter end of February the farmers and others interested in the matter, held a public meeting in Perth, and passed a series of resolutions which involved immediate action, with a view, if possible, of tracing the evil to its source. In the first place, it was resolved that the stomachs of the dogs which died suddenly, and the remains of the rabbits which were found lying beside them in the fields, should be placed in my hands for chemical examination, in order to ascertain if the dogs really had been poisoned. Accordingly, in the beginning of March, I received a hamper, containing, amongst other animal matter, the stomach and contents of a dog, and a considerable piece of a rabbit, part of which the dog had been observed to partake of immediately prior to its death.

The contents of the stomach consisted mainly of oatmeal porridge, accompanied by about three ounces of the muscle of a small animal, corresponding with that of a rabbit. The process followed in this investigation was to digest part of the contents of the stomach in a dilute solution of oxalic acid for some hours, thereafter warm, and strain through muslin. The filtrate was neutralized and rendered

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* This communication was read before the North British Branch of the Pharmaceutical Society at their scientific meeting in April.

slightly alkaline by stirring it with a rod of caustic potash. It was then placed in a narrow-mouthed bottle, several ounces of ether added, and the whole well agitated together. On settling for a short time, the ether, with the strychnine dissolved in it, floated to the surface of the liquid. The upper stratum of fluid was poured off into a porcelain evaporating basin, allowed to evaporate spontaneously to near dryness, slightly heated to remove remaining traces of the ethereal liquid, and then tested for strychnine. The indications which were deemed sufficient for the identification of strychnine were, the *taste* of the extract, and the *violet colour* produced by *bichromate of potassa* and *sulphuric acid*.

The portion of rabbit which had not been partaken of by the deceased dog was subjected to the same process, but the extracted matter was found so largely contaminated with fatty matter, that the *colour test* could not be observed, and the *taste test* was not at all satisfactory. In order to separate these fatty matters, the residue was treated with a hot dilute solution of oxalic acid, heated to near ebullition, allowed to settle, and the under liquid containing the oxalate of strychnine was drawn off by a pipette from the upper one consisting of the fused fat or oil. The water extract was then treated with potash, ether, &c., as previously mentioned, and the tests applied, when very decided indications of the presence of strychnine were obtained.

In regard to the quantity of strychnine employed in the particular instance here specially referred to, there were no attempts made to estimate directly the amount, but several circumstances appeared to me to indicate that a comparatively large dose had been partaken of by the dog. There is no doubt that a certain relation exists between the length of time an animal, after partaking of the poison, will live before it begins to show symptoms of poisoning by strychnine, or succumb to its action, and the greater or less dose which has been administered to it—the larger the dose, the quicker the fatal result; and the smaller the dose, the more tardy are the strychnine symptoms observed. There appears, also, a distinct relation between the time an animal survives a dose of strychnine, and the greater or less fulness of the stomach; for where this organ is well filled with nutriment, the poison is necessarily diffused through much harmless matter, and the greater portion is for the time hindered from being absorbed; so that unless a large dose has been partaken of, a fatal amount may not be absorbed for hours. Now, considering that the stomach of the deceased dog was well filled with food, and that its contents were not at all in a digested condition, I am inclined to assume, that three grains of strychnine would be required to kill an animal in the presence of so much food, and in such a short time as to anticipate the digestion of the meal. This opinion is much strengthened by the fact, that the colour and taste tests were unusually distinct and decided. Granting, then, that the portion of rabbit partaken of by the dog contained three grains of strychnine, it will follow that were the whole rabbit dressed in the same way, between twenty and thirty grains of that poison was employed in preparing this one rabbit. Now, it should be distinctly observed that such a quantity of strychnine could not have been absorbed into the muscular system of the rabbit through its stomach, because experiments conducted by myself, and detailed on previous occasions,* have demonstrated that the quantity of strychnine so absorbed is very minute, and that it is not present in such amount as to be poisonous. The rabbit had undoubtedly been dressed for the purpose of destroying animal life; for, independently of the large amount of strychnine, there were no stomach, intestines, head, skin, hair or claws, attached to the muscle of the rabbit, and neither were detected in the stomach of the dog. Hence it follows that the rabbit must have been killed, divested of its skin, head, and viscera, and thereafter strychnine, in some form or other, liberally powdered over the carcase, or placed in incisions made in the muscular tissue.

Since communicating the preceding statement to the Society, I have been

* See *Pharm. Journ.*, August and September, 1856.

engaged in the examination of other cases of a similar nature which occurred in the neighbourhood of Dunse and elsewhere. Each new instance but strengthens the fact, that every now and again strychnine, either pure or as *nux vomica*, is purchased and used by the pound for the purpose of saturating the carcases of rabbits, lambs, &c., with the avowed design of strewing these baits over land for the destruction of vermin, but which are unfortunately open to the thoughtless incursions of valuable sheep-dogs, and even human beings.

REPORT OF THE

RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,

AND OF THE

APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

BY B. H. PAUL, Ph.D.

(*Continued from p.* 570.)

Application of Town Refuse and Sewage for Agricultural Purposes.—(*Concluded.*)—Among other substances which are consumed in ordinary household economy, and which furnish a constant supply of ingredients to town sewage, soap does so to the greatest extent.*

The number of methods that have been proposed for obtaining manure from town sewage are not by any means so numerous as those for working excremental substances. Mr. Campbell considered them under three heads:—

1st. Filtration through various media, before and after the addition of chemical substances.

2nd. Precipitation by means of various re-agents.

3rd. Irrigation.

The method of sewage filtration through various media has been urgently advocated by many. But it will be at once evident to the Chemist that the possible result of such an operation cannot be profitable so far as regards the separation of those ingredients of sewage which constitute its chief manurial value, however advantageous it may be in a merely sanitary point of view.

Even taking the most favourable case, viz., that the excremental material issues from the sewers undecomposed—the facts that the principal part of the ammonia-generating substances, namely, the urea and uric acid, are soluble, and that the chief part of the phosphoric acid exists as phosphate of soda or potash—will show that little is to be gained in this way. Moreover, the enormous proportion of water which is mixed with the valuable material, amounting in the case of London sewage to upwards of four thousand parts, is much greater than would be sufficient for dissolving even the phosphate of lime; for, according to Professor Bischof, phosphate of lime is soluble in about two thousand parts of water saturated with carbonic acid, and the amount of carbonic acid in some sewage water, especially where decomposition has set in, must be very considerable.

A sample of the solid suspended substance of the Croydon sewage was analyzed by Mr. Way, and the absolutely dry substance was found to contain only 2.73 per cent. phosphoric acid and nitrogen, equivalent to 3.94 per cent. ammonia.

Owing to complaints that have been raised by landed proprietors in the neighbourhood of the river Colne, of the contamination of the water by the sewage of the town of Uxbridge, a plan has recently been adopted for filtering the Uxbridge sewage through peat charcoal, by Mr. Pilbrow, the engineer to the local board of works. He uses alternately two filters, consisting of troughs filled with the charcoal, so as to form filtering beds 25 feet long, 2½ feet deep, and 2½ wide, through which the water flows as it issues from the sewers, and is then discharged into the river. The charcoal remains serviceable for six weeks, or thereabouts. The plan is found to purify the water sufficiently to remove objection, it is inexpensive, and the spent charcoal sells readily at £1 per ton.

In 1851 it was proposed by Mr. Richard Dover to add, before filtering the sewage, a mineral acid, together with salts, and on account of their economical use he preferred hydrochloric acid as the acid, and chloride of sodium (common salt) and protosulphate of iron as the salts to be employed. The filtering medium was principally

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* The quantity of soda (NaO) carried into the London sewage from this source amounts to upwards of 600 tons annually, and the fat to 5484 tons. Probably no agricultural value can be assigned to these ingredients of sewage.

to be of charcoal or gypsum; but if little valuable matter for agricultural purposes is retained by the charcoal from filtering ordinary sewage water through it, still less must result from sewage water to which acid has been added, by reason of the acid rendering soluble any insoluble phosphate which might be in the fecal matter, in which state it must inevitably pass through any of the filtering media suggested by Mr. Dover.

Other methods of filtering sewage, both previous to and after treatment with chemical substances, have been proposed, but, from the general improbability of any agricultural advantage being gained from such manipulation of sewage, they may be passed over without further remark.

In the treatment of sewage by *precipitation by means of various re-agents*, the method which seems to have been more adopted than any other for precipitating the solid material from sewage is the one familiarly known as the "liming process."* This method consists in adding lime, hydrate of lime, or milk of lime, to the sewage water. The lime in this case seizes upon some of the organic substance, and forms a kind of network, which, in falling to the bottom, carries with it whatever suspended particles there may be in the liquid, leaving the water tolerably clear.

This was one of the very earliest processes, and arose out of an invention by Dr. Clark, of Aberdeen, patented early in 1841, for "a new mode of rendering certain waters (the water of the Thames being among the number) less impure, and less hard, for the supply and use of manufactories, villages, towns, and cities."

Dr. Clark, some time in that year, was engaged at Manchester, with Mr. John Graham, making experiments with his process at Mayfield Print Works, and an experiment was made upon the Mayfield "return water," which was highly coloured with madder and soap liquor. The experiment in removing all colour, &c., being so successful, led Mr. Graham afterwards to adopt it at the works on the large scale. The river Medlock, which receives all the sewage of Manchester, was next tried, and the process proving successful upon this likewise, Dr. Clark repeated his experiments, and ascertained how much lime it required to purify the Medlock water of the sewage it contained, and fixed it at about one ton per day, and Dr. Clark was in correspondence and had interviews with the authorities of the Duke of Bridgewater's Canal, to purify and sweeten the water before it should enter the canal; but probably Dr. Clark did not contemplate this action when he took out his patent for purifying water, though it would appear that shortly afterwards he accomplished what has been stated.

Unfortunately, however, this treatment, though efficacious in separating some substances that are dissolved in sewage, has no such action upon the ammoniacal substances, the potash salts, or perhaps to any considerable extent upon the phosphoric acid, as is shown by the analysis of manure prepared in this way:—

Analysis made by	Voelcker.	T. J. Herapath.	Smith and McDougal.	Calvert.
Locality of Sewage.....	Leicester.	Cardiff Gaol.	Manchester.	Manchester.
Water.....	10.52	4.71	...	—
Organic matters	12.46	15.91	22.00	24 56
Insoluble silicious matter ...	13.50	2.74	...	9.65
Sulphate of lime	1.76	3.26	...	
Oxides of iron and alumina...	2.89	...	...	
Manganese.....	...	...	...	65.16
Carbonate of lime	52.99		...	
Carbonate of magnesia	3.67	69.28	...	
Chloride of sodium	0.45		...	—
Potash	0.26		...	—
Phosphate of lime	2.27	4.10	1.51	—
Phosphoric acid	...	...	...	0.62
	100.77	100.00	...	100.00
Nitrogen	0.60	1.125	...	—
= Ammonia	0.72	1.366	0.525	—

* See *Pharmaceutical Journal*, xvi., 567.

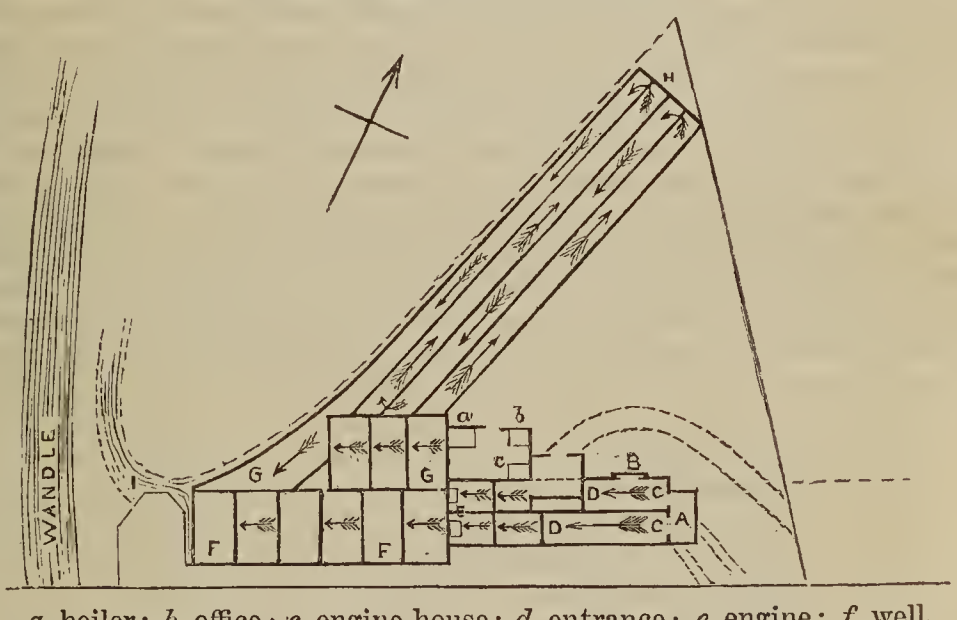
Dr. R. A. Smith, Mr. MacDougal, and Mr. Crace Calvert have recently examined this process, with a view to its being adopted by the authorities of Manchester and Salford in purifying the river Medlock and the Bridgewater Canal, and it has received a general recommendation from these gentlemen as a proper sanitary movement; but they concur in the opinion that the deposit cannot be considered as a valuable manure. The two former gentlemen report that they found the smell of the Medlock water was not entirely removed by precipitation, or, if removed, that it soon returned; they also remark, "we can, however, calculate on no receipts from products."

Mr. Campbell has also observed, that although the water may run away bright enough from precipitated sewage, yet afterwards it marks its course down a stream by leaving a deposit, on the vegetation at the sides, of a whitish, slimy, gelatinous-looking substance, which, although appearing at first inspection like animal substance, on exposure to air becomes green, and is really a vegetable growth.

Although Dr. Clark's experiments in 1841 were well known to many persons at Manchester, it would appear that they were not generally known, from the fact that the use of lime in precipitating sewage has since been the subject of several patents, the earliest of which was taken out by Mr. William Higgs, in 1846, in which, along with several mechanical arrangements, he includes "hydrate of lime, commonly termed slaked lime, to precipitate the solid, mineral, and vegetable matters from sewage." Mr. Higgs proposed to pump the sewage into tanks, where it is to be limed, and the precipitate subsiding the water is drawn off. The precipitate, removed into shallow canals and exposed to become more dry, is afterwards moulded into bricks, which are dried and afterwards broken up into powder.

In 1851, Mr. Thomas Wickstead proposed to manufacture manure from sewage waters by mixing them with milk of lime, collecting the deposit and submitting it to certain centrifugal drying machinery; and works have been erected at Leicester upon a large scale to work the sewage under the superintendence of Mr. Wickstead. The water is precipitated in tanks; besides Tottenham and Leicester, the liming process has been tried and adopted at several other places, among others at Croydon.

SEWAGE WORKS AT CROYDON.



a, boiler; *b*, office; *c*, engine-house; *d*, entrance; *e*, engine; *f*, well.

Here the sewage is brought to the works by four pipes at A. Immediately that it issues from these pipes, slaked lime is added and well mixed by a wheel driven by the current of the sewage water; it then flows into the building B, in which are two sets of beds C, each 106 feet long, 13 broad, and 2 deep. These are used alternate weeks, one being worked whilst the solid matter is removed from the other. In these beds, more especially the first, a large quantity of the solid matter held in suspension and solution is deposited, and the water from the previous admixture of the lime is rendered innoxious. The cross walls D, for intercepting the solid matter, are built with apertures to about three inches of the level of the water, so that the solid matter precipitated is not again disturbed, and the water flows without any apparent current, and percolates through a bed of stones E, which prevents the possibility of the escape of any paper or other solid matter, except in a state of fine division. The water then flows through other channels or reservoirs F, G, H, where a large quantity of the lighter solid matter is precipitated, and the water discharged in a tolerably pure state at I, K, L. The reservoir F is 104 feet long and 23 wide. G is 30 feet in width; the cross-walls on these beds are constructed on the same principle as those in the building, and the time occupied by the passage of the water

from A to I and K is about 1½ hours. The reservoirs maked H have been recently constructed, and on another principle, the walls being perforated only at each alternate end, consequently the water is retained for a much longer period (three hours being occupied in its passage from A to L), and is discharged in a much purer state than at I and K, proving that the increased transparency of the water is in ratio to the increased area of reservoirs and decreased speed of the current.

The solid matter deposited in the beds C averages about fourteen or sixteen tons a week. This is conveyed to the well, and, by means of a Jacob's ladder, is lifted to a lead-lined machine, where by the mixture of other materials a valuable and remunerative manure is said to be obtained.

In 1852, Mr. Henry Stothert proposed to precipitate "the more substantive parts of sewage water" by a "combination of compound animal and vegetable charcoal," with fresh caustic lime or sulphate of alumina, or sulphate of zinc. The charcoal might be obtained by distilling the precipitated sewage matters or night soil, &c. Again, in 1854, Mr. Wickstead proposed to use lime and finely divided charcoal. These are to be mixed up with water, and to flow into the sewage in a stream.

The moist precipitate from sewage water, obtained by the liming process, has always an unpleasant odour, which, in most cases, is generally removed by the admixture of a small quantity of charcoal or some carbonaceous substance. Whether it was to obviate the necessity of this after mixing with charcoal to deodorize the sewage precipitate or not, that these processes were suggested, does not appear, but some persons have inferred that, as dry charcoal has the power of absorbing and retaining gases, and amongst these ammonia, so should it take the ammonia in the sewage water; and this reasoning may have been the cause, perhaps, of the suggestion. However, it has been ascertained by actual experiment that charcoal has no power whatever upon solutions of ammonia or its salts, and no portion of them is retained by filtering through any thickness of charcoal.

A process has recently been tried in Edinburgh, and one or two other towns in Scotland, upon rather a large scale, under the superintendence of Mr. James Alexander Manning. Mr. Manning, in 1853, proposed to "defecate and separate certain matters from sewage," by employing animal charcoal, alum, and carbonate of soda and gypsum. He found, however, that alum was too expensive, and proposed in 1854 using the "soft sludge," a refuse from alum works, instead of the alum. Mr. Manning suggests employing two circular tanks, to be used alternately, and capable of holding 100,000 gallons each. Along with this quantity of sewage water is put 800 lbs. of "alum sludge," some cream of lime, and "waste animal charcoal," the whole agitated for about five minutes and allowed to subside, when the water is run off. Mr. Manning says the subsidence of the precipitate is so rapid, that the mixing and precipitating will all be accomplished in the time it would take to fill the second tank. The same materials are said to serve for three more operations upon the same quantity of water. The manure obtained in this way has the following composition:—

	No. 1.	No. 2.
Organic matter	37.45	50.00
Phosphates		10.14
Phosphate of lime	2.65	
Chlorides and sulphates	22.89	
Carbonate of lime	1.77	1.75
Sulphate of lime		9.46
Silica	19.73	23.98
Alumina	16.13	
Omitted in analysis		4.67
	100.00	100.00
Ammonia	1.50	2.95

The results refer to the material perfectly dried, which would not be the case in practice, for all artificial manures contain from about ten to twenty per cent., or even more, of uncombined water, which they lose at 212° Fahr. If we take into consideration this water, the first material does not appear to be very different from that obtained with lime from sewage water. The second material, however, is considerably different. An extraordinary addition in working the process, of

"waste animal charcoal," as Mr. Manning terms it, but which is a substance of high money value in the market, might account for the very great increase of phosphates over the first; but the increase of ammonia cannot be thus accounted for. In the event of the alum sludge becoming a scarce commodity, Mr. Manning proposes to manufacture it, and thinks he can do so at a cost not exceeding five shillings per ton, exclusive of carriage.

Although the amounts of phosphates and ammonia in the second material furnished by this process are greater than have hitherto been observed in any precipitated sewage, they are but a small item of what passes away in the water from the process.

The several processes for treating excreta and sewage are remarkable, from the great similarity which exists between many of them. This may, in a great measure, be accounted for from the circumstance that until recently there was a very great difficulty in ascertaining what inventions had been made the subject of patents. But now that all the specifications of patents are being printed, together with classified indices, and abridgments of specifications relating to particular subjects, by the Commissioners of Patents, under the superintendence of Mr. Woodcroft, it is to be hoped that in future there will be less needless expenditure of time, money, and labour by the inventor, and that before he enters upon a field of discovery he may study for himself what has already been done by those who have preceded him in the subject he has under contemplation.

Mr. Campbell then went on to consider the subject of *irrigation*, and the use of sewage for this purpose.

It would be needless to speculate upon the origin of irrigation by water alone. In Egypt, Persia, and China, it was long practised before it found its way into the more western nations, and to us. The most early notice in this country of the value of water for irrigating land is to be found in the work upon natural history written by the great Lord Bacon nearly two and a half centuries ago; he there observes that there are two ways of accomplishing this, the one is "by letting in and shutting out water at some seasons, and this serves only for meadows which are along some river;" and the other is "to bring water from some hanging grounds, where there are springs, into the lower grounds." Lord Bacon observes, "that it maketh an excellent improvement both for corn and grass, and it is the richer if those hanging grounds be fruitful, because it washeth off some of the fatness of the earth; but, however," he observes, "it profiteth much."

At this time the luxury of water-closets was unknown, and the fecal matter of the population was not carried into sewers, but collected in cesspools, from whence it was periodically removed and used for agricultural purposes. The introduction of water-closets, however, quite altered this state of things, and led to a very much greater amount of water being required by each individual, and the formation of sewers to carry it away. Generally, if a river passed near or through a town the sewage was carried into it, or if near to the sea, it was discharged on the shore. This state of things generally prevails throughout this country at the present time in most towns; and when sewers were first originated, and for some time afterwards, was universal; but from observing the beneficial effects of water alone in fructifying the land, or receiving perhaps a hint from some of our foreign neighbours, who are, and were, ahead of us in these matters, it was suggested by some of the more intelligent persons of the community that the sewage water might be employed beneficially for irrigating land. Early in this century it was adopted in several places throughout the kingdom, especially in those favourably situated for its distribution, and free from engineering difficulties. Of course the benefits which have arisen in each instance, as is to be expected, are not equal, and depend much on the absorptive powers of the soil.

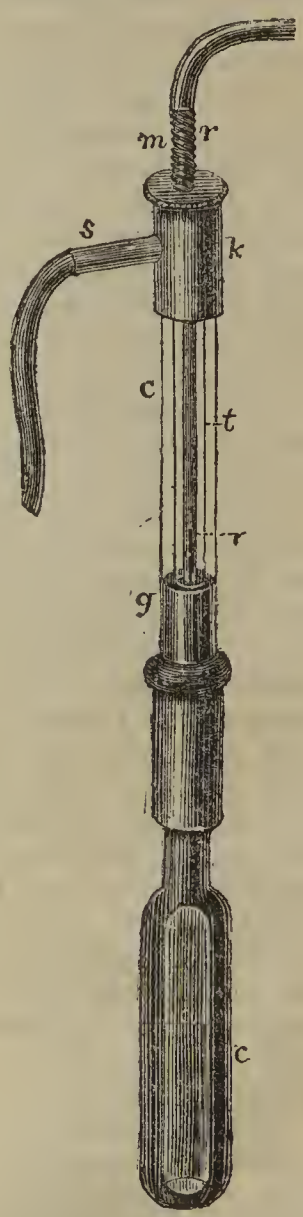
Around Edinburgh and many other towns, some of the meadow lands are manured by sewage water, and yield large crops of grass, often as much as seven crops in the year. The average rent per annum of these meadow lands round Edinburgh is £20 per acre, and there are many cases where land, comparatively speaking valueless, has been made highly valuable by sewage irrigation; but, for instance, the sands between Musselburgh and Leith, near Edinburgh, which were previously waste sand, and of *no* value, growing only a few whins and rank grass here and there, were irrigated about the year 1819 with sewage water from Edinburgh, and after the first year of that treatment they bore a fair crop of grass, and have since borne four or

five crops annually, and bring in a rent of from £13 to £22 per acre. The extent of these lands is about thirty acres, and they were laid out for irrigation at a cost of about £800. Previous to this very remarkable result of the value of sewage water, the lands between Edinburgh and Portobello had been watered in the same manner, and produced great crops. But here an absolutely barren sea-sand was converted into most valuable property.

Taking into consideration all the circumstances of the case, it would appear that there are no means known by which a valuable solid manure can be extracted from sewage; consequently, the utilization of sewage for agricultural purposes is limited to the method of irrigation. Whether this is practicable in the vicinity of London, is a question which remains to be answered by engineers and agriculturists. The chemical consideration of the subject shows that there is a money value, and that that money value attaches to material which must, at a great annual cost, be removed to a great distance from London, whether remuneratively or not. Taking the data furnished by the chemist, it is for the farmer to determine what area will serve to absorb the sewage of London, and for the engineer to show whether this can be executed with profit to the farmer and with advantage to the town population.

Elastic Glue for Dentists.—M. Lallemant, of Paris, finds* that by mixing gelatine with an equal weight of glycerine it is rendered permanently elastic, and is preserved from putrefaction. This material may be used for dentists' purposes, for printers' inking rollers, &c.

Regulator for obtaining constant Temperatures by means of Gas.—Professor Bunsen† has devised an instrument for this purpose, which is a modification of Kemp's‡ regulator. It consists of a cylindrical glass tube, *c c*, closed at the bottom, fitted with a brass cap, *k*, and containing an air vessel, *a*, open at the bottom, and isolated by mercury, with which the cylinder is filled to *g*. A wide glass tube, *t*, with a lateral tube, *s*, extends downwards into the mercury, and at the upper end is firmly connected with a narrow metal tube, *r*, which, passing down its centre, likewise dips into the mercury. It has a long narrow slit at the lower end, a small lateral aperture at the upper end, and may be moved up and down by means of the screw, *m*. This instrument is placed inside the closet to be heated, and the gas is made to traverse it before being burnt, entering at *r*, and issuing through the narrow slit into the wide tube, *t*, thence through the lateral tube, *s*, into a caoutchouc tube attached to the burner. By this arrangement a constant temperature is ensured in the closet, for according to the expansion or contraction of the air in the air vessel, *a*, the level of the mercury is raised or lowered, and the passage of gas through the narrow slit retarded or accelerated. By raising or lowering the tube, *r*, by means of the screw, *m*, the instrument may be adjusted for maintaining any degree of temperature, from 100 deg. to 500 deg. Fahr. When the increase of temperature is rapid, the narrow slit might be quite closed, and the flame extinguished; therefore, the lateral aperture is made just large enough to admit of the passage of gas sufficient to prevent this.



Opium from French Poppies.—MM. Descharmes and Bénard have estimated§ the amount of morphia in the "opium" prepared at different parts of the Somme Department at from 20·62 to 22 per cent. They observed also that during the drying of the opium the morphia undergoes a gradual alteration. The opium obtained from poppies grown in very calcareous soil contained a large amount of lime salts.

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* *Journal de Pharmacie et de Chimie*, January, 1857, p. 23.
† *Polytechnisches Journal*, cxliii., 342. ‡ Ib. cxvii. 352.
§ *Comptes Rendus*, October, 1856, No. 17.

Preservation of Flesh, &c.—M. Robert has contrived a method* of preserving animal and vegetable substances, which is easily managed, cheap, and admits of their external appearance as well as their peculiar characters being retained. It consists in exposing the partly dried substances to an atmosphere of sulphurous acid gas, and then covering them with a thin film of albumen mixed with molasses. The flesh of animals that have been killed by blowing air into the breast cannot be preserved in this way. In the first instance the flesh is freed from blood, and partly dried in a current of air; the limbs are then hung in an air-tight chamber, so as not to touch, and the sulphurous acid introduced. The time during which the meat is left in contact with the gas depends upon the size of the pieces. For pieces of from four to six pounds, ten minutes is sufficient; pieces of two hundredweight require twenty or five-and-twenty minutes. They are then removed from the chamber, dried in the open air, and brushed over with the albuminous varnish. Flesh thus prepared may be cooked in the usual way, and even after keeping a long time is quite as fresh and good as when the animal has recently been slaughtered. This method of preservation is said to be equally applicable to game and poultry, with or without the feathers, fish, fruit, and vegetables. For transport, the preserved substances are packed in casks, into which tallow or fat is poured at as low a temperature as possible. This prevents shaking, which is always very prejudicial. The preservation of flesh, &c., by this method has received the sanction of the French Minister of Public Health.

Researches on Respiration.—Dr. E. Smith has communicated to the Royal Society the results of his experiments commenced in 1855, in reference to respiration and pulsation in health and disease, and having for their object to determine the serial changes in the twenty-four hours. Those on the rate of the functions made at every hour of six days and nights, in phthisis, and of three days and nights, in health, have already been published in the "Transactions" of the Royal Medico-Chirurgical Society. This paper is devoted chiefly to the determination of the quantity of air inspired under similar circumstances, but the rate of respiration and pulsation, the depth of inspiration, the temperature, and the barometric pressure, are also recorded. The inquiries were made upon and by the author, and by the aid of a spirometer, consisting of Glover's patent dry gas-meter, of improved manufacture, of reversed action, so as to measure inspiration, and graduated to record from 1 to 1,000,000 cubic inches. When in use, an ori-nasal mouthpiece was employed, connected with the spirometer by vulcanized caoutchouc tubing. The first part of the paper was devoted to a consideration of the total quantity of air breathed in the twenty-four hours. This was effected by three experiments. 1st. By wearing the instrument during five minutes at the commencement of every $\frac{1}{4}$ of an hour, from 5 A.M. to $6\frac{1}{2}$ P.M.; and every $\frac{1}{2}$ hour, from $6\frac{1}{2}$ P.M. to $3\frac{1}{2}$ A.M. Exercise and food were taken intermediately, but sleep was necessarily excluded. The inquiry was always made in the sitting posture. 2ndly. By wearing it continuously during the whole twenty-four hours, except at intervals amounting collectively to forty minutes, and recording the results every five minutes. Food, exercise, and sleep were taken, and the periods recorded. The mind was occupied in reading or in games, and the whole day passed in a normal condition. No fatigue was felt after the inquiry. 3rdly. By an inquiry similar to the last, but continued only from $6\frac{3}{4}$ P.M. to $5\frac{3}{4}$ A.M., and having for its object to determine the precise influence of sleep. In the first inquiry, the average returns were, after supper, 354 cubic inches; before breakfast, 358 cubic in.; after breakfast, 445 cubic in.; after dinner, 448 cubic in.; and after tea, 454 cubic in. per minute. In the second inquiry, the minimum quantity was 21.230 cubic in., and the maximum nearly 40.000 cubic in. per hour. The average of the lying posture was 450 cubic in. per minute; and of the sitting posture, 533 cubic in. per minute. The third showed a minimum respiration of 352 cubic in. per minute during sleep. From these facts was deduced the wear of system in various classes of the community, and it was shown that different classes must breathe daily quantities of air, varying from 700,000 cubic in. to 1,400,000 cubic in.

The second part of the paper contained the results of inquiries into the influence of the following agents:—

1st. Those which increase respiration—viz., posture of body walking and running at various amounts of speed, walking in the sea, riding on horseback in the various

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* *Armengaud's Genie Industriel*, December, 1856, p. 315.

paces, riding in carriages and on the railway in different classes, and on the engine at various rates of speed, the labour of the tread-wheel, ascending and descending steps, rowing, swimming, Marshall Hall's ready method, reading and singing, carrying various weights at a certain speed, cold bathing; albumen (egg), gelatin, beef-steak, oatmeal, wheaten-bread, potatoes, milk, suet and milk, sugar, rum, tea, coffee, ether, sunlight, heat.

2nd. Those which decreased the quantity of air breathed—viz., darkness, cold air inspired; all fats, as cod-liver oil, olive oil, butter, beef fat; arrowroot, brandy, wine, kirchenwasser, compound and fœtid spirits of ammonia, opium, morphia, hydrocyanic acid, tartar emetic; and salines, as chloride of sodium, and febrifuge medicines.

3rd. Those which had a mixed effect—viz., chloroform, chloric ether, and amylene. Digitalis first increased and then decreased the quantity.

In each instance the instrument was worn during five minutes at one time, and the results averaged per minute. In reference to exercise, that agent was continued from three to ten minutes before the influence of it was sought. When ascertaining the effects of food and medicines, the sitting posture was exclusively selected, and was maintained for some time before the inquiry commenced, and whilst the preliminary observation was made which constituted the basis quantity. An inquiry was made directly after having swallowed the substance under investigation, and repeated during the first quarter of an hour, and subsequently at the beginning of each succeeding quarter of an hour for about two hours. The periods selected for the inquiry were before breakfast and at least three hours after a meal, so as to avoid the perturbing influence of previous food. The author strongly insisted upon the following circumstances being noted and maintained unchanged during such inquiries —viz., posture, sunlight, temperature, season of the year, exertion, and mental emotions. He recorded the number, absolutely and also relatively to the basis quantity recorded immediately before the investigation; but in reference to the influence of food and medicines he believed the latter only to have importance. He found that the various kinds of exercise increased the quantity of air inspired per minute up to seven times the quantity breathed normally in the quiet lying posture. In reference to food, the most interesting facts were, that whilst all fats and pure starch decrease respiration, sugar largely increases it; and that albumen, gelatin, milk, and all ordinary nitrogenous diet, increase it to a moderate degree only. Also, that whilst brandy, wine, and kirchenwasser greatly decrease respiration, rum largely increases it. Ammonia gave opposite results, according to the preparation and dose, which accounted for the difference of opinion as to its influence. The author was assured of the correctness of Dr. Billing's assertion, that ammonia may be a sedative, and, moreover, that it is a most powerful one. Certain agents, as digitalis, had a contrary action during their influence, first to increase, and then to decrease, respiration. The most powerful respiratory excitants were—ether, tea, and sugar; and the most powerful depressants were, some preparations of ammonia, opium, morphia, tartarized antimony, kirchenwasser, and sleep; and these, with salines, which have the same action, are the common antiphlogistic and febrifuge remedies. Sunlight increased, darkness decreased, respiration; heat increased, and cold decreased, respiration, when the difference was considerable; cold applied to the skin increased, but cold air inspired decreased, respiration.

In the 3rd part were contained the results of inquiries into the temperature of the expired air, showing that it was from 4 deg. to 8 deg. lower when inspiration had been effected through the mouth than through the nose—a fact teaching the importance and the benefit of breathing through the nostrils only in cold weather. It was also proved that a part of the body may have its temperature increased by friction, &c., 20 deg. in a few minutes, without having received any increase of heat externally—a fact implying that under such circumstances the heat of the surface is rather due to a larger distribution of blood there than to any increased generation of heat.

The tables and diagrams accompanying the paper contained the record of 1200 series of observations, and various deductions of professional and general interest were appended. The subject was entirely novel, as previous observers had limited their attention to the chemical changes in respiration, and at irregular intervals only.

Dr. Theophilus Thompson said, he was unwilling such a communication should pass without comment, although from the copiousness of material it was difficult to select. The Secretary, in reading the paper, had called special attention to the

observations on sugar. The observation of the author, that sugar increased the amount of respiration, was certainly opposed to the opinion he (Dr. Thompson) had been induced to form from other experiments, particularly those made a few years since by Dr. Böcker of Bonn, who, when varying his diet by the addition of two ounces of sugar daily, found the carbonic acid exhaled from his lungs reduced by about one-tenth. Similar results had also occurred under the use of diluted alcohol, and of various alcoholic drinks. Brandy, beer, white Rhenish wine, and still more red Burgundy, occasioned a reduction in the quantity of carbonic acid expired; the average reduction being, probably, about a fifth. Tea, in Dr. Böcker's experiments, did not materially influence the respiratory combustion, but it acted like alcoholic drinks as respected the reduction of earthy phosphates in the urine—a result more observable under the alcoholic experiments, and most of all from the use of sugar, by which the earthy phosphates were reduced one-half; the general conclusion being, that all these agents tended to arrest the metamorphosis of tissue, and thus to enable us to do with a less amount of ordinary food. It would thus appear that Dr. Smith's experiments, except in the case of brandy and, to a certain extent, tea, were not in harmony with the statements of Böcker; for although the quantity of respiration had not necessarily an exact relation to the carbonic acid exhaled, it was reasonable to expect these conditions to increase or diminish together. He (Dr. Thompson) mentioned these points, not as throwing doubt on the experiments of the author, but as proving the necessity for further inquiry. Observations made with such care and zeal were of peculiar value in inquiries not merely affecting the restoration of the sick, but illustrating agencies important to the whole community, because affecting, moment by moment, the comfort and efficiency of persons in health.

Professor Sharpey bore testimony to the careful precautions and patient labour with which the author's experiments had been made, as peculiarly calculated to lead to trustworthy results. It was a curious circumstance that brandy and rum should act differently on the respiration—the former decreasing, the latter increasing it. He (Dr. Sharpey) agreed with the opinion expressed by Dr. Thompson, that with increase of respiration, an increase of carbonic acid must be expected, although not necessarily proportional. The inquiry instituted opened questions of remarkable interest. The different amount of respiration in men and women was curious. Andral and Gavarret, for example, had observed that the amount of respiration in women, particularly after puberty, was much less than that of men. Dr. Smith's remarks on the influence of light confirmed those of other investigators. Frogs had been observed to have their respiration increased by this agent. He (Dr. Sharpey) believed not only through its influence on the skin, but probably also through the medium of the eye. He considered that the harmony between the author's results and those obtained by the best previous observers was evidence of their truthfulness.

Professor Carpenter gave an interesting description of the apparatus employed by the author, and showed the great advantage derivable from a lengthened and continuous series of observations, so contrived as to avoid the restraint and discomfort which some other modes of experiment involved, whilst free from different sources of uncertainty present in observations made in confined chambers without the use of any apparatus. Carrying out such observations continuously for twenty-four hours without fatigue implied normal conditions. Dr. Carpenter referred to the remarks made on light and darkness in relation to respiration. He knew of instances in which persons were affected with laborious and distressing breathing if the candle was extinguished during their sleep. Such instances were extreme, but they were favourable to the opinion that light under ordinary conditions had some effect as a stimulus to the reflex actions concerned in respiration.

Mr. Babbage had often regretted that such important functions as the circulation and respiration were disregarded in books on Natural History. He thought the average rapidity of pulse and respiration of animals should be recorded as a part of the description in works on Zoology, and that every intelligent person might assist, especially as respects domestic animals, in establishing the averages. Mr. Babbage had lately at the Zoological Gardens counted the respirations of various animals. He was understood to say that he found that of the lepidoscren rather more than 5 in a minute, of the flounder 15, the rhinoceros 17, and the Bengal tiger 25.

The Noble President expressed his regret that on such occasions as the present the valuable materials produced in discussion could not be recorded, as well as the paper by which they were elicited.

Test for Grape Sugar.—Professor Bottger* states, that when a liquid containing grape sugar is mixed with carbonate of soda and some basic nitrate of bismuth, and then boiled, the presence of sugar, even in very minute quantity, is indicated by the grey coloration or blackening of the suspended bismuth salt, which is reduced either to suboxide or to metal. He states, also, that none of the other constituents of urine give rise to this reduction, and consequently recommends this test as preferable to Trommer's test for the examination of urine. Cane sugar does not produce reduction of the bismuth salt like grape sugar, so that the presence of grape sugar mixed with cane sugar may be detected by this test.

Conversion of Albuminous Substances into Urea.—M. Becamp† has succeeded in producing urea from albumen and analogous nitrogenous substances, by the oxidizing action of a solution of permanganate of potash at a temperature of 176 deg. F. Dumas had long held the opinion that urea was a production of the oxidation of nitrogenous constituents of blood and of the tissues, and has made numerous attempts to obtain experimental demonstration of this view, but always without success. The method which he adopted was to oxidize albumen in the presence of alkaline liquids, by means of chromate of potash, oxide of mercury, oxide of silver, and peroxide of lead. Some years ago, Dumas and Prévost found that when the kidneys of animals were tied, urea appeared in the blood, and inferred thence that the substance is not produced in the kidneys, though it is excreted by them. M. Picard has furnished a confirmation of this inference. He found that the minutest trace of urea can be separated from blood by precipitating with nitrate of mercury; and in this way estimated the amount of urea in blood from the renal artery of a dog at 0.0365 per cent., and that in the renal vein at 0.0186 per cent. His observations on the human system showed that the arterial blood passing into the kidneys within 24 hours, gave up about 28 grammes of urea. The quantity of urea in the urine of the individuals on which these observations were made, varied between 27 and 28 grammes. Consequently, the arterial blood passing into the kidneys contains more urea than the venous blood passing out of them ; and the quantity of urea disappearing during the passage of the blood through the kidneys, corresponds with that excreted in the urine. Hence it appears proved that the kidneys do not secrete, but merely excrete urea. Therefore urea, in which the nitrogen excreted by the animal organism is concentrated, is, as Dumas conjectured, a direct product of respiration, and, like carbonic acid, is produced in the blood, by slow oxidation, by means of air furnished by the lungs. Both substances are carried away by the blood, the carbonic acid being discharged in the gaseous state from the surface of the lungs, and the urea in solution being separated in the kidneys ; the former serving as food for plants, by absorption through the leaves, the latter serving a similar purpose by absorption through the roots.

Adulteration of Honey.—Hr. Frickhinger‡ had occasion to examine some samples of honey from the Rhône district, which presented a remarkable gelatinous character, became thin when heated, and gelatinized in the cold without crystallizing. The amount of water varied from 29 to 33 per cent. The presence of gelatine was indicated by the copious precipitate produced on the addition of tannic acid to the clear water solution of the honey. The presence of mucilaginous substances was indicated by the thick sediment produced on the addition of alcohol to the clear water solution. In some instances the clear water solution of the honey coagulated when boiled, indicating the presence of albuminous substances.

Production of Sulphuric Acid from Gypsum.—Hr. Köhsel§ has devised a method of obtaining sulphuric acid, which consists in converting gypsum into sulphide of calcium by igniting it with carbon in cylinders, then exposing the sulphide, mixed with water, to the action of carbonic acid gas at a moderate temperature, burning the sulphuretted hydrogen thus produced, and afterwards treating the sulphurous acid and water vapour in the ordinary way in lead chambers. The carbonic acid gas generated in the first stage of the process is used for decomposing the sulphide of calcium of a subsequent charge, and the waste heat of the igniting furnace is made available for producing the requisite temperature for this decomposition.

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* *Neues Repertorium für Pharmacie.*
† *Comptes Rendus*, xliii., 548.
‡ *Neues Repertorium für Pharmacie*, vi., 28.
§ *Mittheilungen des hannoverschen Gewerbevereins*, 1856, p. 135.

IMPROVED CONSTRUCTION OF RUHMKORFF'S INDUCTION COIL.

Some correspondents having expressed a wish that we would give some information respecting the Ruhmkorff's Induction Coils, which have been exhibited two or three times at the *Conversazioni* of the Pharmaceutical Society, we extract the following from the new edition of Dr. Noad's *Manual of Electricity* and from the *Philosophical Magazine*. It would be difficult to explain the principle and the details of construction of the induction apparatus without illustrative figures; we must therefore refer, on these points, to Dr. Noad's very excellent work already named, where the whole subject is fully described, or to vol. xii. p. 333, of this Journal, where a brief elementary explanation of the induction coil will be found. Starting, then, with a knowledge of the general principles of the construction of the coil, the following quotations will describe the successive improvements which have been effected with the view of increasing its effects. Dr. Noad says:—

"In the year 1842, MM. Masson and Breguet constructed a coil, with which they obtained a spark between the terminals of the secondary coil *in vacuo*, and also ignited platinum wire; but, from the imperfect way in which the wire was insulated, they could not obtain a sensible spark in free air, though they succeeded in charging a condenser. About the same time, Mr. Hearder, of Plymouth, constructed a powerful arrangement of primary and secondary wires under the form of a medical instrument, for which, in September, 1846, he received the silver medal of the Royal Polytechnic Society of Cornwall. With this apparatus surprising electrical effects were produced; strong sparks were obtained *in air*, Leyden jars were charged, and a striking distance obtained of several inches through rarefied air. In 1851, M. Ruhmkorff, of Paris, brought the induction coil to a far greater degree of perfection than it had hitherto attained, by paying the greatest possible attention to the insulation of the secondary wire, which, after being covered with silk, was surrounded with a layer of gum lac, and the ends attached to glass columns fixed on the base board of the instrument: he likewise increased considerably the length of the coil, diminishing at the same time its thickness, having found experimentally that the inductive effects of the apparatus are increased in proportion as the number of spirals is augmented. As thus constructed the instrument exhibited extraordinary effects: brilliant sparks were not only obtained at the point of disjunction, but also between the wire and a conducting body in communication with the earth, whilst *in vacuo* a brilliant and continuous stream of stratified light was produced. By interposing in the circuit of the primary or inducing wire a single condenser, as recommended by Fizeau, a further augmentation of power was obtained; the sparks in free air were increased to nearly three-fourths of an inch in length, and were accompanied by a snapping noise, while the power of the shocks was exalted to such a degree as to be excruciating and even dangerous.*

"The induction apparatus, as at present constructed by M. Ruhmkorff, consists of a primary coil of well-insulated wire of about 0.078 inch in diameter, with a secondary of fine thin wire—the No. 36 of commerce. The bobbin is arranged horizontally, the core is of thin card-board, and the ends are either of glass or of well-varnished wood. . . . . ."

"Since the foregoing observations upon this interesting apparatus were written, we have had an opportunity of comparing Ruhmkorff's instrument with one constructed by Mr. Hearder of Plymouth. The bobbin upon which the wire of this coil is wound is 6 inches in length, the coil itself being about 4½ inches thick. The quantity of secondary wire is about 3000 yards (No. 35). The length of the primary is so adapted to the electro-motive force of the battery as to enable it to develop in the iron core the highest amount of magnetic power; the energy of the instrument depending, according to Hearder's view, entirely on the degree of magnetization of the iron, and being quite irrespective of any peculiar arrangement of the primary wire. The iron core is, as in Ruhmkorff's instrument, a bundle of small wires capped with solid ends, through one of which passes transversely to the axis an iron

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* It is stated that M. Quet was so violently affected by incautiously exposing himself to a shock from the coil, that he was obliged to keep his bed for some time.

adjusting screw, serving to regulate the distance between the end of the core and the iron armature on the end of the vibrating spring, which acts as the contact breaker. This spring is a very strong one, having a platinum stud in the middle of its length, which makes contact with a platinum spill below; the spring being strong, and the armature heavy, the vibrations are rapid, and the contacts very firm. The sparks between two platinum terminals followed one another with great rapidity through *five-eighths* of an inch *in air*, the primary wire being excited by four cells of Grove's battery; the discharge *in vacuo* was very magnificent through several inches, though (contrary to the statement of Poggendorff), when the conductor was turned off, a very feeble discharge through not more than two inches could be obtained. When a Leyden jar containing three square feet of coated glass was interposed in the circuit of the secondary, a battery of ten cells being employed, a remarkably sonorous and vivid discharge was maintained in an uninterrupted manner. The noise of the discharge was decidedly greater, and the light more voluminous and bright, than with Ruhmkorff's instrument similarly excited."

One of the instruments to which we have alluded, as having been exhibited at the Pharmaceutical Society, was constructed by Mr. Bentley of Sloane Street, an amateur experimenter in this department of science, and the following letter, which appeared in the *Philosophical Magazine* for January, 1857, explains the peculiarities in the construction of this apparatus. Mr. Bentley says:—

"As many of your readers may be interested in the production of induction coils, I take the liberty of sending a short, but, I trust, concise description of one I have constructed; and as it is the result of two years' experience, it will no doubt prove valuable to those interested in electro-magnetic induction.

"The instrument referred to gives an induction spark 2 inches long in air of ordinary density, when excited by four or five cells of Grove's battery; and the quantity of static electricity is so great, that it will charge a quart Leyden jar two hundred times per second, the discharge taking place through an interval of $1\frac{1}{4}$ inch.

"The thermal phænomena are also very striking; for when the secondary wires are separated about three-quarters of an inch, an arc of flame passes the interval, and fuses electrodes presenting twenty times the sectional area of the wire from which the current is produced; the flame can at the same time be acted upon by a permanent magnet in the same manner as the voltaic arc. This heating power appears to depend, not upon the *quantity* of electricity passing, but upon the resistance it can overcome; consequently the thermal effects disappear *in vacuo*, to be reproduced upon the gradual admission of air or other resisting media.

"My induction apparatus differs from Ruhmkorff's in three important parts of its structure: first, in the method of insulation; secondly, in the contact breaker; and thirdly, in the formation of the condenser. Ruhmkorff, as your readers are aware, insulated his secondary wire with shellac; but as this substance, though an excellent insulator, is liable to crack, I have adopted gutta-percha tissue for the insulation of my wire; and I apply it in the form of ribbon an inch wide, which I obtain by cutting slices from a firm roll of that substance; four or five layers are necessary between each layer of wire, as the current from a single layer is sufficiently intense to strike through one-tenth of an inch of air.

"The contact breaker is a most important part of the apparatus, for without the one I have contrived I do not obtain nearly so great a quantity of static electricity. It consists of a strong steel spring, fastened firmly at one end, and having the platinum contact piece in the centre, behind which is a piece of iron to be attracted by the iron core; at the other end of the spring is a screw, by which I can force the two contact pieces together with a force of one ounce to ten pounds; the steel spring therefore vibrates from its centre, and it is only when the whole of the battery current has traversed the primary wire that the iron core has sufficient power to draw the two contact pieces asunder. It may be interesting to state that the condenser has not the slightest effect on the *quantity* of electric force developed in the secondary wire, but increases the intensity to an enormous extent; and as it is better to have it as large as possible, I have formed mine of 120 sheets of tinfoil, 6×12, placed between double that number of varnished sheets of paper, the alternate sheets of foil being brought out and soldered to appropriate binding-screws. The length of secondary wire in the coil described is 2 miles, and its gauge No. 35. The primary helix is formed of 30 yards of No. 14 wire, and is wound on an iron wire core 9 inches

long and $1\frac{3}{4}$ inch diameter, in which is placed as an axis an iron rod to support the coil, which I place in a box constructed for that purpose.

"Such, then, is the very slight description I have to offer of an instrument which produces a spark five times the length of those produced by any of Ruhmkorff's arrangements; but as he was certainly the originator of these instruments, and therefore deserves nearly all the credit, I hope that mine and those produced by others will still be called Ruhmkorff's coils."

TATE'S DOUBLE-ACTING AIR-PUMP.

The following is a description of the improvements introduced by Mr. Tate in the construction of air-pumps. Pumps constructed on Mr. Tate's principle were exhibited at the last Conversazione of the Pharmaceutical Society :—

"The chief points of novelty in this air-pump consist in a double piston acting in a single cylinder, and in the superior system of valves. This double piston with a single cylinder gives to the instrument all the properties of an ordinary air-pump with two cylinders: this new instrument, in fact, may be regarded as a single-barrelled pump, capable of performing its work with only one-half the usual motion.

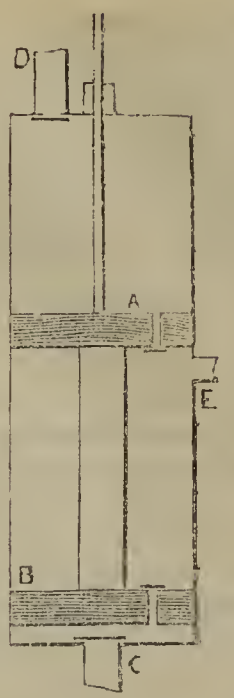
"The annexed diagram represents a section of the cylinder, &c., of my new air-pump: CD the cylinder; A and B solid pistons rigidly connected by a rod, and moved by the piston-rod AN, passing through a stuffing-box S; V and *v* valves lifting outwards; R an open pipe at the middle of the cylinder leading to the receiver from which the air is to be exhausted. The distance between the extreme faces of the pistons is about three-eighths of an inch less than one-half the length of the cylinder, this three-eighths of an inch being the space requisite for clearing the exhausting pipe R. The pistons are each about $1\frac{1}{2}$ inch in thickness, and the rod connecting them may be of any section consistent with strength. The effective length of the stroke is equal to the space between one side of the pipe R and the corresponding end face of the cylinder, or it is very nearly equal to one-half the length of the cylinder.

"In an upward stroke, the air above the piston A is propelled through the valve V into the atmosphere, while a vacuum is being formed beneath the piston B. When the piston A strikes against the top of the cylinder, the air from the receiver rushes through the pipe R and diffuses itself through the lower half of the cylinder. In a downward stroke, the air beneath the piston B is propelled through the valve *v* into the atmosphere, while a vacuum is being formed above the piston A; and so on. It will be observed that *the double piston performs a double duty at every single stroke;* for while a vacuum is being formed on one side of the cylinder by one piston, the other piston is propelling air from the opposite side of the cylinder into the atmosphere."

"For the sake of distinction, I shall call this form of the pump No. 1. There is a little loss of dynamic effect in working the pump No. 1, from the circumstance that one of the solid pistons forms a vacuum on one end of the cylinder at every stroke; but this loss of *work*, or dynamic effect, is considerably less than that which takes place in the common pump. In order to eliminate this defect, I have placed valves in the pistons A and B, lifting towards the corresponding ends of the cylinder. By this arrangement the exhaustion is performed with the least possible expenditure of work or dynamic effect. This form of the pump, for the sake of reference, I shall call No. 2. But this economic construction is attended with a little loss of exhausting power, owing to the greater amount of air which fills the valve spaces. Whilst the exhaustion effected by No. 1 is measured by about two-tenths of an inch of mercury, that of No. 2 is measured by about four-tenths of an inch.

"Some persons, in my opinion without a sufficient reason, seem to object to the piston passing the exhaustion orifice. In order to suit the views of such persons, I have constructed another form of the pump, which I shall call No. 3, in which the valves are constructed after the manner of No. 2, but in which the pistons are placed a little more apart, so that neither of them ever passes the exhaustion orifice, but

at the end of every stroke the interior face of one of the pistons just arrives at the corresponding edge of the exhausting orifice. It is scarcely necessary to observe, that this form of the instrument possesses the same property as that of No. 2 with respect to the economy of dynamic effect; but it will be seen that its exhausting power is the same as that of the common pump.



"With the view of showing the applicability of the advantages of the double piston acting in a single cylinder to the valve system of the common pump, I have constructed the form, which I shall call No. 4, represented in the annexed cut, where the arrangement of the pistons, A and B, is the same as in No. 3. In this case all the valves lift inwards; the orifice E, at the centre of the cylinder, leads into the atmosphere; and the pipes C and D lead to the receiver. The exhausting power, as well as the dynamic effect, of this pump is the same as that of an ordinary double-barrelled pump. At the same time it must be observed, that this form of the double piston acting in the single cylinder, enables us to apply the moving pressure in the most simple manner."

PROCESSES FOR COMBINING QUININE, IODINE, &c., WITH COD-LIVER OIL AND OTHER OILS.

A PATENT was obtained by Mr. Horsley in December, 1855, for the invention of "*Certain means of treating quinine and iodine, and other mineral medicines, in order to cause them to combine with cod-liver oil, or any other fish oil, or with seed oil.*" At an earlier period, namely, in January, 1855, Mr. Bastick had described a mode of preparing a "solution of quinine in cod-liver oil," a notice of which appeared in this Journal in March of that year. These preparations being to some extent used in medicine, we give the details, as far as they have been published, of the processes by which they are obtained.

Quinine with Cod-liver Oil. This was first described by Mr. Bastick as being obtained by adding anhydrous quinine, in fine powder, to the oil contained in a suitable vessel, and applying the heat of a water-bath until a clear solution is formed. It was afterwards suggested that the quinine should be first dissolved in strong spirit, this solution added to the oil, and the heat of a water-bath applied until the whole of the spirit is evaporated. It has usually been made in the proportion of two grains of quinine to one ounce of oil. Mr. Horsley does not claim the preparation of quinine with cod-liver oil. In his specification he states:—

"By means of certain processes I effect the combination or solution of several medicines with cod-liver oil, or other fixed oil obtained from fish or seed; but as cod-liver oil is that which will be chiefly used, I shall describe my invention as being performed with that oil only; and when any other oil of any of the descriptions above mentioned shall be used in lieu thereof, it will only be necessary to substitute an equivalent proportion of such oil for the cod-liver oil.

"To combine quinine and iodine with cod-liver oil, I use the pure alkaloid of either of the cinchona barks, known as quinine and cinchonine, and which may be obtained by adding an alkali to a solution of sulphate of quinine or cinchonine, so as to precipitate the alkaloid. I dissolve either of these alkaloids in cod-liver oil heated to a temperature of about 140 deg. of Fahrenheit's thermometer in the proportion of about two grains of the alkaloid to the ounce, continuing the heat until the solution is effected. I then take this preparation whilst still warm, and triturate it with a quantity of iodine equivalent to a quarter of a grain for every ounce, and I continue the trituration until the solution has been effected. The proportions which I have given for combining these chemicals are, I think, the best, but they may of course be somewhat varied.

"To combine iodide of iron with cod-liver oil, I first dissolve iodine in cod-liver oil at about the temperature above mentioned, or by trituration in cold oil, the iodine being in the proportion of about 22 scruples to the gallon of oil. I then add to the solution about 8 scruples Quevennes iron (as reduced by hydrogen), and heat it to a

temperature of about 180 deg. Fahrenheit until a combination of the iodine with the iron has been effected, which the chemist will know by the colour. I filter the preparation thus made, which is then ready for use.

"To combine bromide of iron with cod-liver oil, I first dissolve about 10 scruples of bromine in alcohol, and then mix it with an excess of iron filings, in order to insure the neutralization of the bromine. I heat this mixture till it becomes colourless, and evaporate to dryness. I then treat the mass in one gallon of cod-liver oil until it is dissolved, after which I filter the solution.

"To combine acetate of iron with cod-liver oil, I first prepare the acetate as follows:—I take, say, one ounce of protosulphate of iron and two ounces of acetate of potash, and rub them together in a mortar until the mixture becomes a brown red paste, which is then dried and powdered. I heat this dried product with one gallon of cod-liver oil to a temperature of about 140 deg., and continue the heat until the acetate of iron is dissolved or the oil saturated, after which I filter the solution.

"To combine iodide of arsenic with cod-liver oil, I take about 32 grains of freshly-made iodide of arsenic, and mix it with a gallon of cod-liver oil, and heat to about 120 deg., continuing the heat until the iodide has been dissolved, after which I filter the solution.

"To combine iodide of arsenic and mercury with cod-liver oil, I first prepare the compound salt as follows:—I take the proportions of iodine, arsenic, and mercury recommended by Donovan, and after dissolving them evaporate the solution to dryness. I then dissolve the dry mixture in cod-liver oil in the proportion of 64 grains of the dry mixture to every gallon of oil.

"To combine iodide of zinc with cod-liver oil, I take that material freshly prepared, and mix it with cod-liver oil in the proportion of about a grain and a half of iodide of zinc to an ounce of oil, and then dissolve the iodide, and filter the solution, in like manner as hereinbefore described with respect to iodide of arsenic and cod-liver oil.

"In order to effect a combination of iodide of iron and quinine, or iodide of iron and cinchonine with cod-liver oil, I make a solution of the iodide of iron in oil, as before described, and also a solution of quinine or cinchonine in cod-liver oil, as before described, and then mix those solutions together in equal proportions, and filter the mixture. Solutions or combinations of other substances with cod-liver oil may likewise be effected by these means, such as solutions or combinations of cod-liver oil with valerianate of quinine, valerianate of zinc, acetate of lead, and iodide of sulphur.

"And having now described the nature of the said invention, and in what manner the same is to be performed, I declare that I claim the combination of such medicines as aforesaid with cod-liver oil, or other oil of the kinds before mentioned, in manner hereinbefore described."

The claim contained in the last paragraph appears to be inconsistent with the title of the patent, which is "*Certain means of treating quinine and iodine, &c.*" There is no mention made in the title of the invention of the products, but merely of certain processes for obtaining them. We believe it is doubted whether the patent could be sustained, even with reference to the processes specified, as several of these differ from those given in the provisional specification, and some of them had been previously adopted by other chemists.

NEW MODE OF PREPARING RESIN OF SCAMMONY.

A PATENT was granted in July, 1856, to Dr. Williamson, Professor of Chemistry at University College, for "improvements in obtaining the resin and sugar of scammony."

The patentee says :—"Heretofore it has been usual to tap the scammony roots when growing, and thus to obtain fluid products therefrom. Now my invention consists in grinding or reducing the roots of scammony, and in placing the same in a suitable vessel, and then causing the vapour of alcohol to pass through such reduced or ground roots. The condensed product obtained is evaporated to a treacly consistency, and washed with water, which, being evaporated, leaves the sugar of scammony ; and the residue, when washed, contains the resin, which is

heated and dried. Although I have mentioned alcohol as the material or solvent preferred, another may be used."

We do not think it is likely that this resin of scammony will supersede the ordinary scammony of commerce. By the usual mode of tapping the roots, a product is obtained, which long experience has proved, when pure, to be a valuable medicine, the properties of which are well understood. There is no evidence, that we are aware of, to show that a product identical with the preceding, or equally efficacious, would always be obtained when the roots are exhausted with alcohol.

ON A NEW SULPHIDE OF CARBON (CS).

BY M. E. BAUDRIMONT.

As yet only one sulphide of carbon has been known to exist, namely, CS_2, corresponding to carbonic acid CO_2. A protosulphide CS corresponding to carbonic oxide CO has never been obtained. It is the discovery of this compound which I have the honour of announcing to the Academy, and which has occupied me for several months. I propose at present to briefly indicate the preparation and analysis of this new body with some of its properties, and to reserve for a future occasion the complete account of its investigation.

Protosulphide of carbon may be obtained by the following processes:—

1st. By decomposing the vapour of ordinary bisulphide of carbon with spongy platinum, or with pumicestone heated to redness; under these circumstances the bisulphide is decomposed, an abundant deposit of sulphur takes place which often chokes up the tube, and a gaseous body is formed, which is the protosulphide of carbon CS. This well-defined reaction is sufficiently explicit.

2nd. It is obtained simultaneously with the bisulphide when that body is prepared by the ordinary method.

3rd. By decomposing the vapour of CS_2 at a red heat with pure lampblack or wood charcoal, but especially with fragments of animal charcoal.

4th. By decomposing the vapour of the bisulphide with hydrogen at a red heat.

5th. By calcining sulphide of antimony with an excess of charcoal.

6th. By the reaction of carbonic oxide upon sulphuretted hydrogen at a red heat.

$$CO + HS = HO + CS.$$

7th. By the reaction of sulphurous acid upon carburetted hydrogen at a red heat.

8th. By the reaction of carbide of hydrogen with chloride of sulphur at a red heat.

9th. It is produced during the decomposition of sulphocyanogen by heat, &c.

The first process yields the gas in a state of purity; but when obtained by the other methods, it is contaminated with sulphide of hydrogen or carbonic oxide. It may, however, be purified from these by being rapidly passed through a solution of acetate of lead, chloride of copper dissolved in hydrochloric acid, and then drying the gas collected over mercury.

This body is gaseous, colourless, and possesses an odour reminding one of ordinary sulphide of carbon, but not disagreeable, and strongly ethereal. Respired in any large quantity, it appears to be powerfully anæsthetic. It burns with a bright blue flame, producing carbonic acid and sulphurous acid, with a little sulphur. Its density is a little greater than carbonic acid. It resists the cold produced by a mixture of ice and salt. Water dissolves about its own volume of it, but the solution rapidly decomposes into sulphuretted hydrogen and carbonic oxide.

$$HO + CS = CO + HS.$$

It is not more soluble in alcohol or ether.

The solution of chloride of copper does not absorb it. Solution of acetate of lead is not affected immediately, but, after some hours' contact, the liquor blackens, and the salt is completely transformed into carbonic oxide and sulphide of lead. In contact with solutions of the alkalies, potash, soda, &c., it is rapidly decomposed. With lime water, for example, the reaction gives sulphide of calcium and a volume of carbonic oxide, equal to that of the gas employed. This remarkable reaction accurately establishes its composition $CaO + CS = CaS + CO$, no carbonate of lime being produced.

At a red heat it is feebly decomposed—1st, by a spongy platinum; 2ndly, by the vapour of water into HS and CO; 3rdly, very readily by hydrogen into HS and CH; 4thly, by copper into graphitoid carbon and sulphide of copper; and, finally,

by exposure to the sun with an equal volume of chlorine, a reaction takes place, a partial condensation and formation of compounds, which I am at present investigating. Analyzed by oxygen in the endiometer, it gives equal volumes of carbonic acid and sulphurous acid, from which we may deduce the formula CS as representing its composition. This composition is also established by the action of lime water, which, as I have stated, resolves it completely into carbonic oxide and sulphide of calcium without the production of any carbonate of lime. We also arrive at the same conclusion from determining the quantities of carbon and sulphide of copper, produced by its decomposition with that metal.

Many chemists have attempted to discover this body; and its having escaped their investigations, is attributable, without doubt, to its reaction upon water and the solutions of the alkalies, which resolve it into carbonic oxide and sulphuretted hydrogen.—*Comptes Rendus.*

ON THE SOLUBILITY OF IODIDES IN SYRUPUS FERRI IODIDI.

BY JNO. M. MAISCH.

Recently a syrup of iodide of iron came into my hands which had been obtained of a manufacturing Chemist. As it had undergone decomposition, and contained free iodine, I was desirous of neutralizing the same, so as to have it fit for use. Having put some fragments of iron into it, the syrup was set aside for several weeks, when, on examining it, I was surprised to find the iron covered with copper. From what source was that metal present, and why was it not precipitated by the iodine as iodide of copper, which is considered insoluble? These questions presented themselves, and, in order to solve them, a series of experiments were undertaken with the following result:—

The syrup, which in the above way had been deprived of copper, still contained free iodine. One fluid ounce was mixed with a solution of sulphate of copper, two grains of which had been dissolved in 100 grs. of water; every drop of this solution produced a thick precipitate, which, however, dissolved on being agitated with the syrup, which remained perfectly clear after 16 grains of the solution had been added; the 17th grain produced a slight cloudiness, which was little increased on addition of the 18th grain, the syrup still remaining transparent; but 20 grains caused such a precipitate that the syrup looked very turbid, and had lost all transparency. Thus it will be seen that one fluid ounce was capable of decomposing $\frac{1}{3}$ gr. of sulphate of copper, and holding the formed iodide of copper in solution. $\frac{1}{3}$ gr. of sulphate contains $\frac{1}{12}$ gr. of metallic copper, corresponding with $\frac{1}{4}$ gr. of its iodide.

(Cu = 31.6; CuO, SO_3 + 5 HO = 124.6; Cu_2I = 189.5)

Thirty grains of iron and three grains of copper, both in the state of fine filings, were agitated with eight grains of iodine and the necessary quantity of water. A greyish matter floated in the liquid corresponding in all physical properties with a precipitate of iodide of copper. The liquid was filtered into a phial containing enough sugar to make one ounce of syrup, which was of a greenish unsuspicious appearance, and did not separate any copper on a bright spatula, having been left in contact with it for an hour; the iron wire which had been thrown in, however, was covered with copper after standing twelve hours, and a considerable precipitate of iodide of copper had been thrown down.

Freshly precipitated iodide of copper was put on a filter, and syrup of iodide of iron filtered through it. The filtered liquor, on standing till next day, had precipitated iodide of copper, and the remaining solution still contained copper which could be thrown down by iron.

A syrup which does not contain free iodine may be agitated with copper turnings without dissolving any of it; but when containing iodine in a free state, it dissolved some copper, which covered the iron that had been afterwards thrown in.

A much larger proportion of iodide of copper could be dissolved in the syrup if it was kept at 212 deg. Fahr. One fluid ounce of the syrup was put in a water bath heated to 212 deg.; a quantity of a solution containing 2 grs. of sulphate of copper had to be added before a cloudiness was obtained. These 2 grs. correspond with $1\frac{1}{2}$ gr. of iodide of copper, which, for the greater part, was thrown down on cooling.

Most experiments were performed with the neutral syrup, and with another sample that had decomposed on exposure to the air, and contained some free iodine. The

results of the solubility of iodide of copper varied slightly in both cases, and the neutral syrup seems to take up rather more of that insoluble compound; the difference, though, is very slight.

It was curiosity now which induced me to see whether others of the insoluble iodides were taken up by the iron preparation; and I was surprised to find the iodides of lead, silver, and mercury easily soluble. The green iodide of mercury turned black and dark green as soon as thrown in the syrup; the red iodide was taken up in very considerable quantities, and after standing several days, the syrup had a voluminous sediment of a dirty blackish yellow iodide, while the supernatant liquid had scarcely a brownish tinge. Here the question arises, how does a reduction take place, and what is the result of it? May not the formation of a soluble double iodide of iron and mercury cause the ready solubility of the red iodide of the metal, which, through the influence of the atmosphere, is decomposed again?

These experiments show us at any rate—

1st. That iodide of iron dissolves more or less readily the insoluble iodides of some heavy metals, especially of *copper*, *lead*, *silver*, and *mercury*.

2nd. That the presence of copper during the process of preparing the syrup causes the same to be contaminated with that poisonous metal, although iron may have been in large excess.

3rd. That iron decomposes all iodide of copper thus dissolved, only after a prolonged contact.

The practical results will be—

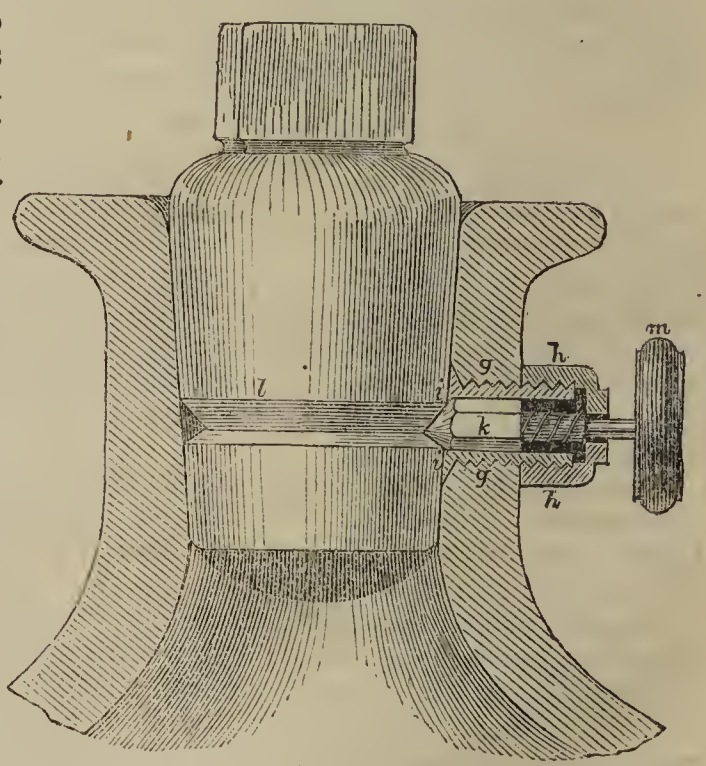
1st. To guard against the presence of any metal but iron during the preparation of this officinal syrup.

2nd. To be able to combine the action of mercury and iron with iodine in a dissolved state. On this, however, some more experiments are needed.—*American Journal of Pharmacy.*

LOCKING AND UNLOCKING BOTTLES, JARS, &c.

Patented by George Henry Stevens, of 14, Stafford-row, Pimlico.
(Sealed 5th May, 1857. Dated 6th November, 1856.)

The object of this invention is to fix the stoppers of bottles by means of a bolt or key, *m*, passing through a metal tube, *h h*, fixed by cement or sawder in a hole, *g g*, drilled in the neck of the bottle. The plug, *k*, of the bolt is pointed at the extremity, and when screwed up enters a groove, *l l*, in the stopper.



The advantages of the contrivance are:—1st. For convenience in travelling, the stoppers being fixed without the necessity of tying them over. 2nd. The contents of a bottle, if precious or dangerous, may be secured by removing the key, without which no person can take out the stopper. 3rd. It is suggested that the invention would be useful for bottles containing poisons used in dispensing prescriptions, as the act of unscrewing the stopper would remind the dispenser of the nature of the contents, and cause him to think.

This latter notion is complimentary.

We have not thought it necessary to figure the air-tight jars, which, in general appearance and utility, resemble those constructed under Cooper's patent.

THE DIVISION OF LABOUR.—A HINT TO PHARMACEUTISTS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—Has it ever occurred to your Pharmaceutical readers to consider in all its bearings the dispensing of prescriptions for general practitioners? I am of opinion that it is a perfectly legitimate part of our business, one that might be made to pay, one that leads naturally to friendly relations between the parties, but one, unfortunatcly, that is frequently despised by the Pharmaceutist, and said, by the general practitioner, not to work well.

Amongst other reasons why it does not work well, is the fact that we do not lay ourselves out for, or appreciate such business; neither are our establishments or arrangements such as to carry it out efficiently. In this, I think we, as Pharmaceutists, are wrong. Let us consider, first, the very natural objection entertained by many of the middle class, to *two bills*, having to pay both surgeon and chemist; second, the trouble saved to the patient, which is of importance where not too many servants are kept; third, the very great objection to writing a prescription for a *small fee*, which is deep in the mind of the general practitioner, and not to be wondered at. Accepting things as they are likely to be, aiming at improvements, not impossibilities; can we not offer a few suggestions to our brethren on this topic, which may be of advantage to them pecuniarily, and every way? To gain the confidence of the general practitioner, to induce him to forego the saving in preparing his own pills and mixtures, is the object at which we should aim: were such a plan legalized or compulsory, I do not think we should have any reason to complain. Why should not the surgeon, after making his rounds, call in at his neighbour's the chemist, write in a book his formulæ, and take no further thought, assured that an efficient staff will send out his remedies properly compounded, and in proper time? Such ought to be the case, and if it were so, a remunerative price should be paid, and payment not delayed too long. But instead of this satisfactory arrangement, what do we hear? on the one side complaints of misdirections and delays, and on the other, of needless trouble given and want of thought, to say nothing of whispers of bad debts. These mutual complaints are, I fear, too often well founded; but at the root of them lies, a want of appreciation of, or taking kindly to the plan. I do not think dispensing for surgeons ought to be despised. It is, at least, more profitable than dealing in Patents Medicines. I think more might be done in it, and the inducement for surgeons to open shops lessened.

The Pharmaceutist with his well appointed shop, his retail man, dispenser, laboratory man, and boys, is in the exact position to send out all the remedies required; whilst the person whose mind is occupied in the study of disease, and therapeutics, may indeed be advantageously relieved from thought as to the procuring, testing, compounding, and dispatching drugs and chemicals. Let us aim at co-operation, not antagonism: a scientific division of labour may tend to heal divisions between distinct, but allied branches of a noble profession. I know that the ideal of many of our body is, a universal writing of prescriptions—may it soon be realized; meanwhile, let us not despise "the day of small things."

Yours, obediently,
J. L. Moore.

1, *Craven Place, Paddington.*

[It is possible that the suggestion of Mr. Moore may be a novelty to some of our readers, but we know that it has been for years carried into practice by many with a favourable result. We have never heard of the inconvenience attending it which Mr. Moore refers to, and consider the arrangement a good illustration of the division of labour. Two of our correspondents (at Staleybridge and at Ashton) give us a melancholy account of the disputes and jealousy between medical men and Chemists in their neighbourhood, and state that the former are always on the look out for a pretext for a prosecution under the Apothecaries' Act. We advise the parties engaged in this childish quarrel to behave like reasonable beings, and try the arrangement recommended by Mr. Moore, bearing in mind that each person ought to understand his own business best; and, although it is impossible to avoid exceptional cases on both sides, it is the fact that the regular business of the Medical man is to prescribe, that of the Chemist to dispense and sell medicines.—Ed.]

POISONING BY MORPHIA.

On Friday, June 5, an inquest was held before P. F. Currie, Esq., Coroner, Liverpool, on the body of Edith Mary Sillar, aged two years, daughter of Mr. David Sillar, merchant, 41, Shaw Street, who died from the effect of morphia, dispensed by mistake for sugar. It appeared from the evidence, that a prescription written for the child by Mr. Bickersteth, was taken to the shop of Mr. Jackson, Druggist, Netherfield-road, and was dispensed by the assistant, Paul Strange, aged 22. And it appeared that while so engaged, another prescription came in which contained morphia, and was made up before the first prescription was finished ; the two bottles, one containing morphia, and the other powdered sugar, were left on the counter, and on resuming the first prescription, it would appear that the bottle containing morphia was used instead of the one containing sugar. The assistant had no suspicion of having made any mistake, but when Dr. Sellar stated that some intensely bitter powder had been used, it occurred to him that he must have substituted the morphia by mistake, as above indicated. The adjourned inquest was resumed on the following Tuesday, when

Mr. Aspinall, barrister, instructed by Mr. Martin, solicitor, appeared on behalf of the assistant, Mr. Paul Strange.

Mr. Edward Robert Bickersteth, surgeon, being re-called, said he had made a *post mortem* examination of the body in the presence of Dr. Edwards, professor of chemistry. He delivered the stomach unopened to Dr. Edwards. All the viscera were perfectly healthy. The cause of death was congestion of the brain. This might have been the result of a narcotic. He considered that a quarter of a grain of morphia was a very dangerous dose for so young a child. A grain would be quite sufficient to cause death.

By Mr. Aspinall.—The mistake made by the dispenser, the bottles being together, is not a very unlikely one ; it is possible, but it would be an indication of gross negligence.

By the Coroner.—Morphia and powdered sugar are very much alike, as far as appearance goes.

Mr. James Blake, the beadle of the court, deposed to having handed the powders to Dr. Edwards for examination.

Mr. John Baker Edwards being sworn, said :—I am an analytical chemist, and professor of chemistry and medical jurisprudence at the Royal Infirmary School of Medicine. I received on Friday last, from Mr. Blake, in this court, two powders and a prescription. The latter I now produce. I marked the powders No. 1 and No. 2, and weighed them. No 1 weighed 3½ grains, No. 2 weighed 5½ grains. I examined No 1 qualitatively for the ingredients named in the prescription, and I detected the presence of chalk, mercury, rhubarb, and salt of morphia. No sugar was present. I examined No. 2 qualitatively, for morphia. I treated the powder with chloroform and alcohol, and obtained the morphia in crystals, weighing 3 grains and 2-10ths. The insoluble ingredients weighed 1 grain and 9-10ths. I attended the *post mortem* examination of the deceased child, and removed the stomach and contents, and portion of the viscera, for chemical analysis. I extracted morphia from the contents of the stomach, by means of hot alcohol, and obtained it in a crystalline form. I identified it by means of all the usual tests—namely, nitric acid, iodic acid, and perchloride of iron. The quantity present was more than sufficient to cause death. Morphia and powdered sugar, in appearance, are very much alike ; but they differ very much in their relative weight. The muriate of morphia would occupy double the bulk in space that sugar would. I think a careful dispenser would have his attention drawn to that fact—the difference in weight. The powders differed in weight, but that may have been accounted for by having been tested.

The jury deliberated for upwards of an hour, and then returned a verdict of "Chance medley against Paul Strange, the dispenser of the medicine."

The foreman also expressed an opinion that there should be a greater distinction between bottles containing poisons and other drugs.

POISONING BY THE SUBSTITUTION OF ARSENIC FOR WHITE LEAD.

A case of accidental poisoning by the sale and application of arsenic in mistake for white lead has occurred at Worcester, resulting in the death of a child named Norman, on Saturday, May 30. A coroner's inquest was held, which, after adjourn-

ment, terminated on Tuesday, June 2. The circumstances are as follow:—The child, who was healthy, was born about six weeks ago; and the mother, who had been in the habit of using white lead to dust certain portions of her infants' bodies (the ordinary practice in nursing), sent to the shop of a druggist named Stringer, living in one of the principal streets of the town, for a pennyworth of white lead. The messenger, the child's own brother, was served by an apprentice named Evans with a white powder having the appearance of white lead, which was applied, but which caused excessive irritation of the skin. Some more was sent for, and this time Mr. Stringer himself served the article from the same drawer. The irritating effects of the powder continued to increase, a wound formed, and the child died in great pain. Mr. H. Bell, surgeon, believing that something deleterious had got into the powder, caused inquiry to be made, and on Mr. Stringer closely examining the white powder in the drawer from which he had sold the quantity to the family of the Normans, he made the discovery that it was arsenic. Arsenic, when applied externally under such circumstances, was, according to the evidence of the medical man, intensely corrosive. The child had died of a slow burning, and must have suffered fearfully. It is only to be hoped that no other calamity may arise out of this fatal mistake, but it seems that the drawer had been filled some weeks with the irritant poison. The circumstances under which the drawer was filled were as follows:—Mr. Stringer keeps his medicines in a cellar, to which his apprentices have access. The arsenic in bulk was kept there, and also the white lead, both in barrels of somewhat similar appearance. Some weeks ago Mr. Stringer's youngest apprentice, a lad named Hennes, who had not been apprenticed to the business four months, seeing the white lead drawer empty, and thinking it to be his duty to fill it, did actually fill it with arsenic from the barrel in the cellar, mistaking it for white lead. The boy states that there was no label "Arsenic" on the barrel, but this Mr. Stringer contradicts. The coroner, Mr. Rea, in summing up, said no legal blame could attach to Mr. Stringer, and the jury returned a verdict of "Accidental death," but at the same time added an expression of their opinion that due care had not been exercised in the management of Mr. Stringer's shop.

PATENTS FOR COATING PILLS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—Having noticed in the *Pharmaceutical Journal* for June a letter from Mr. A. H. Cox, of Brighton, claiming a patent-right for coating pills with a resinous gum, and threatening to prosecute any infringement of the same, I thought it only right that your readers should be made aware of the worthlessness of the above, which was taken out in April, 1854.

We have used the æthereal tincture of tolu for covering ferruginous pills of different kinds as far back as 1844; which, consequently, does away with the validity of Mr. Cox's patent of 1854, ten years later than the date we first used the process.

I am, Sir, your obedient servant,
for Gabriel Jozeau, M. E. Fosser.

49, *Haymarket, June* 23, 1857.

MOTHES' CAPSULES—EXTRAORDINARY PROCEEDINGS.

In case any of our readers should be in the habit of selling Mothes' capsules, they ought to be made aware of the liability they incur, and the mode in which they may protect themselves against imposition and persecution.

A Pharmaceutical Chemist at the west-end of London having sold, as he believed, two boxes of Mothes' capsules, received a notice of proceedings in Chancery for the alleged offence of selling a spurious imitation. He had purchased the capsules of a respectable patent medicine vendor, who was no less astonished than himself at the intimation that they were spurious. A communication took place between the solicitor of the plaintiff and the Chemist against whom proceedings were being taken, and on the facts of the case being represented, he appeared to be indifferent whether the defendant knew the capsules were spurious or not, but said he intended to gibbet him. Protesting at this arbitrary conduct, but not having a fancy for the luxuries of being gibbeted in Chancery, the defendant referred the case to his solicitor, who used his endeavours, by a conference, to effect a compromise. With considerable difficulty

this was arranged, upon condition of the payment of the expenses, amounting to £19 3*s.* 4*d.*, which the wholesale vendor of the capsules agreed to take upon himself.

About the time of this occurrence we received the following letter, which may serve to throw some light on the subject:—

"*May* 28*th*, 1857.

"Mr. Editor,—A circumstance has occurred of sufficient importance to your correspondents to induce us to publish it.

"Monsieur Mothes, the inventor of capsules which bear his name, having been informed that counterfeit imitations of his capsules were made in large quantities in London, sent an agent from Paris to set on foot inquiries and investigations, which have established the following fact—namely, that a Mr. Bateman and a Mr. Turner have manufactured in London for the last ten years, unknown to M. Mothes, spurious capsules, sold as 'Genuine Mothes,' to every Chemist in the United Kingdom.

"The boxes bore the green label, seal, and even the signature of M. Mothes.

"As for the capsules, they were clumsily made, and could only have deceived the blind and credulous.

"M. Mothes, furnished with proofs of this disgraceful fraud, has commenced legal proceedings against the 'imitators,' and it is even said against those Chemists who sell these counterfeit productions!

"We warn those of your correspondents who sell the 'Mothes' imitations' to beware of the consequences of an action severely punished by the laws of 'Patents,' and which would entail on them at least, the unpleasantness of having their names brought before the public in the action now commenced.

"We are, Sir, your obedient Servants,

"Brown, Smith, & Co."

No address having been given, we at first supposed that it was in fact an anonymous letter, the name Brown, Smith and Co., being the *nomme de guerre* of some imaginary firm representing Myth & Co. On being informed respecting the Chancery proceedings, a doubt arose on this question, and we leave our readers to draw their own conclusion from the tenor of the communication, which is published verbatim.

We ought not to omit mentioning, that in the course of the investigation which has taken place, some boxes of Mothes' capsules were obtained from an undoubted source, that two of these specimens, both genuine, were found to differ from each other in the appearance of the box and the label, that the spurious box and label was more like one of these genuine specimens than the two real Mothes' were like each other. The "blind and credulous" may extricate themselves from the horns of this dilemma between Mothe and Myth by manufacturing capsules themselves, or obtaining them of some respectable maker, who will neither taunt them with blindness, nor take advantage of their credulity.

THE ADULTERATION OF BREAD.

The following Report has been presented to the Vestry of St. Marylebone by the Sanitary Committee:—

REPORT ON THE ADULTERATION OF BREAD.

In compliance with the request of the Sanitary Committee, I beg to submit the following report on the subject of the adulteration of bread. Having for some months been engaged in the analysis of bread from the parish and from various districts of London, &c., including St. Pancras, Bermondsey, Whitechapel, and Sussex, the result of my labours has been to prove that alum is in very general use for the purpose, I am informed, by some bakers, of making second flour appear equal to that of the first quality. There are other reasons given for the sophistication, but they all tend to show, that by the use of alum in bread a commercial fraud is practised on the consumer. But it is in the light of an unwholesome ingredient of bread that I would particularly draw attention to the use of alum. The average quantity introduced into the pound of bread cannot be less than from fifteen to twenty grains, and the constant use of such an amount of saline matter, which is not

required for the healthy blood, and does not enter into the constitution of the human frame, must be viewed in no other light than as prejudicial to the natural condition of the body, and therefore as injurious to health.

To extinguish this fraud and injury to health in the parish, would require a constant analysis of bread from the different bakers' shops, and the publication of the names of those who should be found guilty of the offence before a magistrate. For this object I should require a chemical assistant to be constantly at work superintending the scientific processes in my absence. The expense could not be estimated at less than £100 per annum, or equal to the cost of an additional inspector. If the Vestry should consider this expenditure desirable for the benefit of the health of the people, I think I may venture to guarantee to root out the evil. In prosecution of this object, notices must be issued to all the bakers of the parish, intimating the state of the law in reference to the illegality of mixing different kinds of flour without proper marks on the loaves, or of selling under the name of wheaten bread any other than bread made of wheat flour, and of the use of alum; and that on and after a certain day, should the law be infringed, prosecutions will be instituted before the magistrates, and the names of the convicted parties, as the Act permits, be advertised over the parish. I have no doubt whatever that this plan, if carried out with energy, would speedily extinguish nefarious mixtures of inferior flours and the present extensive use of alum.

(Signed) R. D. Thomson, M.D.,
Medical Officer of Health.

THE SCIENTIFIC SOCIETIES AT BURLINGTON HOUSE.

The Government of this country has hitherto contributed so sparingly to the encouragement of science, that every indication of a more liberal policy in this respect is deserving of notice. About two years ago, Burlington House, in Piccadilly, a mansion standing on several acres of ground, was purchased by the Government; and shortly afterwards it was announced that this was to be, at least for the present, assigned for the accommodation of the University of London, and some of the scientific societies. In addition to the space required for the University, there was found to be sufficient accommodation for three societies, and the Royal, Linnean, and Chemical Societies were those to whom, finally, permission was granted to occupy the rooms set apart for that purpose. The Royal Society had previously occupied apartments belonging to the Government in Somerset House, and the principal object contemplated in the removal of this Society was to bring those societies together whose pursuits are in any way connected, and thus to promote intercommunication among the members. The Royal and Linnean Societies are looked upon as the parents, from which several offsets have been separated from time to time. Thus the Astronomical, Geological, and Chemical Societies may be considered as offsets of the Royal Society, while the Zoological and Botanic Societies are offsets of the Linnean. The offspring having, according to the course of nature, been sent out to shift for themselves; having buffeted for a time with the world, and attained to years of maturity it is natural to find a disposition evinced to return again to the parental home. It is considered that many advantages will result from the juxtaposition of the cognate societies, of which the arrangement just made is but the commencement; and it is due to the Royal Society to state, that to it the two Societies, who now for the first time receive assistance from the Government, are mainly indebted for this benefit. The gratuitous provision of a "local habitation" will be a material aid to the Linnean and Chemical Societies, but still greater will be the advantages resulting from recognition by the Government, and association with one of the most distinguished, and probably the most ancient of the associations for the advancement of natural sciences in Europe. The Royal Society appears to have taken its origin from a Club formed about the year 1645, "for communicating the results of their researches in chemistry, medicine, geometry, astronomy, mechanics, magnetism, navigation, and experimental philosophy in general." The Society was formed in 1660, and incorporated in 1662, by Charles II. The meetings of the Society were first held at Gresham College, where the Royal Exchange now

stands. The rooms they had occupied being required for other purposes after the fire of London, the Society moved to Arundel House, the seat of Mr. Howard, of Norfolk, but returned to Gresham College in 1674. In 1701 the Society moved to a spacious house which it purchased in Crane Court, Fleet Street, where it remained until Government assigned to it the apartments in Somerset House, which it has occupied since 1782.

The accommodation provided in Burlington House, although sufficient for the present requirements of the three Societies, is looked upon as a temporary arrangement. It is probable that a much larger building than the present will ultimately be ereeted on the unoccupied ground, and a larger number of the Societies would, no doubt, then be brought into juxtaposition. Meanwhile, the experiment will be tried on a small scale. The Linnean and Chemical Societies have changed their days of meeting to Thursday, the day on which the Royal Society meets, the object being that after the usual business of reading papers, &c., the fellows of the three Societies should meet together, and finish the evening in social intercourse. An arrangement is also made that the libraries of the three Societies shall be accessible to the fellows of either Society. The meetings have been commenced in the new rooms during the past month (June), just before the termination of the season. On the 13th of June, the President of the Royal Society gave a Conversazione, which was numerously attended, and afforded an opportunity to a large number of visitors to witness the accommodation so liberally provided by Government for the scientific societies at Burlington House.

SOUTH KENSINGTON MUSEUM.

Everybody recollects the great Exhibition of 1851; and many are aware that after defraying all the expenses of that undertaking, there was a large sum of money, resulting from the admission fees, which remained as surplus, and for the suitable application of which a Commission was appointed. The Commissioners proposed the establishment of a permanent Museum of Works of Art connected with the School of Design, which had previously been established by the Government. The result has been, an extension of the School of Design into the present Department of Science and Art, under the Committee of Privy Council on Education. Some of the articles exhibited at the Exhibition of 1851 were presented to the Commissioners, and these and other objects of interest formed the nucleus of a Museum, which, in the first instance, was deposited at Marlborough House. A large piece of ground was subsequently purchased at South Kensington, where temporary buildings have been erected, to which the whole of the collections and the school are now removed. The Museum, although still in an imperfect state, is now opened to the public. It was visited by Her Majesty and the Court on Saturday, the 20th of June, and by a select company on Monday and Tuesday, the 22nd and 23rd, since which time the public have been freely admitted. The Museum contains a large number of objects, consisting of sculpture, pictures, illustrations of architecture, objects of ornamental art, and a collection of products derived from the animal kingdom. The classification and arrangement of these objects is, at present, incomplete; and it would, therefore, be unfair to criticise the collection in this respect. It is but the commencement of what may be made a very useful exhibition, but its situation seems likely to limit the extent of the benefit which, in a more central position, it might confer on the working classes. The gallery of pictures, which was presented by Mr. Sheepshanks, and consists of 234 oil-paintings, and a considerable number of sketches, drawings, and etchings, almost all works of British artists, forms the most interesting part of the Museum to the general public.

ROYAL INSTITUTION.

The last of the Friday evening meetings for the season was held on the 12th of June, when a discourse was delivered

ON THE RELATIONS OF GOLD TO LIGHT.

BY PROFESSOR FARADAY.

We have already given the substance of this Lecture in the report of a communication made a short time ago, on the same subject, to the Royal Society, and which

will be found at p. 568 of the preceding volume of this Journal. On the present occasion, Professor Faraday very copiously illustrated the subject by the use of Duboscq's electric light apparatus; with which a pure light of great intensity is produced in a lamp, and a beam from this may be made to pass through transparent media on to a screen, producing effects but little inferior to those caused by the sun's rays. The beautiful green colour of the light transmitted through *gold leaf* was thus shown, and the remarkable effect of applying heat to the leaf of gold, by which the property of transmitting green light is destroyed. After illustrating these effects, it was shown that the property of transmitting green light could be restored to the gold leaf, by the application of pressure to it. Gold in other states of division was then examined. Gold wire, separated into very fine particles by the electric *deflagration*, produces a deposit on glass, which, being examined, either chemically or physically, proves to be pure metallic gold. This deposit transmits various coloured rays: some parts are grey, others green or amethystine, or even a bright ruby. In order to remove any possibility of a compound of gold, as an oxide, being present, the deflagrations were made upon topaz, mica, and rock crystal, as well as glass, and also in atmospheres of carbonic acid and of hydrogen. Still the results were the same, and ruby gold appeared in one case as much as in another. Being heated, all parts of the deposit became of an amethystine or ruby colour; and by pressure these parts could be changed so as to transmit the green ray.

It is well known that the colour of the best ruby glass, such as is used for making smelling bottles and for other purposes, is produced by adding a compound of gold to the glass. Professor Faraday illustrated this, by adding finely divided gold, in the state in which it transmits ruby coloured light, to a solution of gelatine, thus producing a transparent jelly of a beautiful ruby colour. Strong evidence is thus afforded that the gold in ruby coloured glass is in the metallic state.

The attendance at this, the last meeting of the season, was very crowded, and abundant indication has been afforded throughout the season of the continued prosperity of the Royal Institution.

REVIEW.

A Manual of Electricity; *including Galvanism, Magnetism, Diamagnetism, Electrodynamics, Magneto-electricity, and the Electric Telegraph.* By Henry M. Noad, Ph.D., F.R.S. Fourth Edition, entirely rewritten.

We have frequently had occasion to recommend *Dr. Noad's Lectures on Electricity* as the best work on that subject to which the student could refer. The present is a new and extended edition of that work. All that we have said in favour of the preceding editions is applicable to this; and in addition it may be said, that the "Manual" is a more comprehensive and complete treatise upon all that relates to electricity, than were the "Lectures." The last edition of the latter contained 508 pages, whereas the present work is extended to 910 pages. It comprises a sufficiently full and very intelligible account of the existing state of electrical science, brought up to the present time. In this number we have availed ourselves of Dr. Noad's work in describing the recent improvements which have been made in *Ruhmkorff's Induction apparatus.*

BOOKS RECEIVED.

The Elements of Materia Medica and Therapeutics. By Jonathan Pereira, M.D., F.R.S., L.S., &c. &c. Fourth edition, enlarged and improved; including notices of most of the medicinal substances in use in the civilized world, and forming an Encyclopædia of Materia Medica. Vol. II. Part II. London: Longman, Brown, Green, Longmans, and Roberts. 1857. (From the Publishers.)

The Ophthalmia of Ireland: *its Nature, Effects, and Treatment.* By John Williams, A.B., T.C.D., &c. Dublin: Fannin and Co. 1857. (From the Author.)

TO CORRESPONDENTS.

T. (Stalybridge).—We have received a packet from the "Dead-letter Office" with a broken bottle, which appears to have contained syrup of iodide of iron. It is contrary to the rules of the General Post Office to send liquids through the Post.

W. (Scarborough) recommends charcoal respirators for the use of persons attending patients in any infectious disease.

Embryo (Jersey).—In competing for the Botanical prize, reference to Botanical works is admissible; but the mere copying of a herbarium would not be complying with the conditions required, and would be of little advantage to the student.

H. (Crewe).—*Sulphur Soap.* Beat ʒij. of white Windsor soap in a mortar until smooth, add ʒi. of rectified spirit coloured with alkanet root, beat to a uniform paste, and add ʒij. of sublimed sulphur and 10 drops of otto of rose.—*Beasley.*

M. P. S. (Brentwood).—The imperial pint only is recognized in the Pharmacopœia; but the 16 oz. pint is, we believe, more frequently intended in prescriptions. It may be inferred that this is the case when the old nomenclature is used.

W. M. (Leicester).—(1.) Associates are entitled to the Journal.—(2.) The use of camphor to the teeth is objected to by some Dentists; others recommend it.

J. B. (Liverpool).—Some samples of acetate of morphia are whiter than others, which may have given rise to the opinion referred to.

"*Conium*" (London).—Stephenson and Churchill's Botany: the coloured engravings are not published separately.

A Student (London).—(1.) Stephenson and Churchill's Botany, price £4 (Churchill.)—(2.) *Zinc Ointment with Benzoin*, vol. xiv., page 207.—(3 and 4.) *Artificial Fruit Essences*, vol. xi., page 214 and 420.—(5.) Fresenius's Chemical Analysis.

W. S. (Driffield).—Nitrate of silver stains may be removed by iodide of potassium and dilute nitric acid, where the use of the Cyanide is objectionable.

Juvenis (Doncaster)—*A Country Correspondent* (London) should send their names and addresses, so that they may be answered through the Post.

Mr. R. V. Tuson (St. Bartholomew's Hospital) states, that his attention having been called to the acidity of the waters accompanying certain volatile oils when prepared by distillation, he thought it desirable to determine the nature of the acid causing this effect, and he finds it to be acetic acid. The waters examined were those of cloves and cubebs.

Tyro (Cambridge).—Parts by weight are intended.

Verus (Liverpool).—Acetate of quinine is formed, which in the first case is deposited from the solution in crystals.

M. V.—By the application of heat. *S. G.*—Yes.

F. G. (Lower Clapton) wishes for some account of the new anodyne sold under the name of chlorodyne. Another correspondent (*G.*) sends us a printed paper containing a full and particular account of this medicine, with a list of cases; also an "Extract from a Medical Report, furnished by desire of the General Board of Health," &c. "*G.*" inquires whether this is a patent medicine or not? We believe it is. Mr. Davenport, of Great Russell Street, is the wholesale agent.

Another correspondent has sent us the following specimen :

"Homœopathic Institution for Tradespeople, Clerks, &c.—This Institution was founded in 1848, since which time it has afforded relief to hundreds, who otherwise might have gone unrelieved. Thousands die annually from bad drug treatment, who might be saved by Homœopathy, which system treats with the utmost success the following diseases :—Apoplexy, Asthma, Bronchitis, Bruises, Cholera, Colic, Constipation, Coughs, Cramps, Croup, Diarrhœa, Discharges, Runnings, Dropsy, Ear-ache, Eye Diseases, Erysipelas, Fevers, Fits, Flatulence, Giddiness, Gout, Gravel, Gumboil, Headaches, Heartburn, Hooping-cough, Hysteria, Indigestion, Inflammation, Influenza, Itch, Kidney and Liver Affections, Lumbago, Low Spirits, Menstrual Difficulties, Mumps, Measles, Nervousness, Neuralgia, Palpitations, Piles, Pleurisy, Ringworm, Rheumatism, Ruptures, Sickness, Vomiting, Weakness, Sprains, Toothache, Thrush, Throat Ailments, Womb Affections, Ulcers, Sores, Varicose Veins. The Physician can be seen every Morning except Sundays from 11 to 12.—12, —— ——— Street,

Mr. Lowe, of Liverpool, and several other correspondents, have sent us letters on the Poison Bill, with suggestions which will not be overlooked, but our present number contains already more than enough on that subject.

Instructions from Members and Associates, respecting the transmission of the Journal, to the Secretary, 17, Bloomsbury Square, before the 20th of the month.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place.

LIST

OF THE

MEMBERS, ASSOCIATES, AND APPRENTICES

OF

The Pharmaceutical Society of Great Britain.

1857.

MEMBERS OF THE COUNCIL.

PRESIDENT.

Jacob Bell, 338, Oxford Street.

VICE-PRESIDENT.

William Lionel Bird, 42, Castle Street, Oxford Street.

TREASURER.

Daniel Bell Hanbury, Plough Court, Lombard Street.

Ballard, Edwin .....Farringdon
Brew, Thomas A. ....71, East Street, Brighton
Bucklee, William Henry .....86, New Bond Street
Davenport, John Thistlewood...33, Great Russell Street, Bloomsbury
Deane, Henry .....Clapham
Edwards, George.....Dartford
Edwards, John B. .....Berry Street, Liverpool
Keeling, George R.....High Street, Epsom
Macfarlane, John F. .....17, North Bridge, Edinburgh
Meggeson, George .....61,Cannon Street, City
Moore, James L. .....Craven Place, Westbourne Terrace
Morson, Thomas N. R.....Queen's Square, Bloomsbury
Peacock, Hamerton R.....170, High Street, Poplar
Sandford, George Webb .....47, Piccadilly
Smith, Nathaniel.....High Street, Cheltenham
Squire, Peter.....277, Oxford Street
Waugh, George .....177, Regent Street
Woolley, James .....69, Market Street, Manchester

SECRETARY AND REGISTRAR.

Elias Bremridge, 17, Bloomsbury Square.

HONORARY MEMBERS.

Aberdeen .....Thomas Clark, M.D.
Africa .....William F. Daniel, M.D., F.G.S., F.L.S.
Athens .....Xavier Landerer, M.D.
Berlin .....C. G. Mitscherlich, M.D.
Heinrich Rose, M.D.
Brighton .....Edward Gustavus Schweitzer
Bristol .....William Herapath
Calcutta .....W. B. O'Shaughnessy, M.D.
Ceylon.....G. H. K. Thwaites
Christiania .....Frederik Holst
Coblentz.....Friedrich Mohr, Ph.D.
Edinburgh .....Robert Christison, M.D., P.R.S.E.
Douglas Maclagan, M.D., F.R.S.E.
George Wilson, M.D., F.R.S.E.
Erlangen .....Theodor W. C. Martius
Geneva .....Dr. Coindet
Hesse Cassel .....Eduard Martiny
Hesse Darmstadt ...Julius Martiny
London .....William Thomas Brande, F.R.S.
Frederic John Farre, M.D.
Alfred Baring Garrod, M.D.
Thomas Graham, M.D., F.R.S.
A. W. Hofmann, Ph.D., F.R.S.
John Lindley, Ph.D., F.R.S., F.L.S.
William Allen Miller, M.D., F.R.S.
George Owen Rees, M.D., F.R.S.
D. B. Reid, M.D., F.R.S.E.
John Forbes Royle, M.D., F.R.S., F.L.S.
John Stenhouse, LL.D., F.R.S.
Alfred Swaine Taylor, M.D., F.R.S.
Alexander Ure, M.D., A.M., F.R.C.S.
Madras.....Hugh F. C. Cleghorn, M.D.
Munich.....Carl Frederick Philip Von Martius, M.D.
Justus Liebig, M.D., F.R.S.
Paris.....Felix Boudet, Membre de l'Académie de Médecine
Cap, Correspondant de l'Académie de Médecine
Dorvault, Directeur de la Pharmacie Centrale des Pharmaciens
MM. Dumas
Guibourt, Membre de l'Académie de Médecine, Professeur à l'Ecole de Pharmacie
Mialhe, Agrége Libre de la Faculté de Médecine Pharmacien à l'Empereur
Pelouze, Membre de l'Académie des Sciences
Soubeiran, Membre de l'Académie de Médecine, Professeur à la Faculté
Weddell, Docteur en Médecine, Membre de la Societé Philomatique
Philadelphia.....Robert Hare, M.D.
William Proctor, Jun.
George B. Wood, M.D.
Rotterdam .....John Elishee De Vry, M.D.
Stockholm .....N. P. Hamberg, M.D.
St. Domingo .....Sir Robert H. Schomburgk

FOREIGN AND COLONIAL LIFE MEMBERS.

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1851		Alexander, James Lyon	Sydney
1854	48	Archer, William	Geelong
1848	34	Baeër, Gustave E.	Strasbourg
1855	401	Baissac, Pierre Joseph	Mauritius
1852	167	Baschet, George Constant	Mauritius
1849		Baylis, William	Launceston, Tasmania
1852		Bishop, William	Wellington, N. Zealand
1852		Carpenter, Henry	Demerara
1854	347	Dru, Casimir Theodore A.	Mauritius
1850	74	Fleurot, Emile	Mauritius
1855	389	Francis, Henry	Melbourne
1853		Guiot, Jean Felix E.	Mauritius
1850	82	Lamusse, Louis A.	Mauritius
1847		Lediard, Charles	St. Vincent
1847	28	Mailloux, Joseph	Mauritius
1851	93	Mailloux, Auguste	Mauritius
1847	19	Nobrega, Gerardo Jose da	Madeira
1855	407	Noël, Ferdinand	Mauritius
1852	118	Regnaud, Charles	Mauritius
1850		Roberts, Henry	Florence
1852		Roberts, Thomas H.	Gibraltar
1843		Rogers, Henry	Bombay
1852	72	Sinimberghi, Nicholas	Rome
1844	1	Sparks, John	Bombay
1844		Stewart, F. H.	Demerara
1853		Whitburn, Augustus R.	Rome

The figures in the second column correspond with the number of the Certificate of Examination.

* Life Members.

LONDON MEMBERS.

Year of Admission.	No. of Certificate.	NAME.	ADDRESS.
1841		Allan, David	100, Freeschool Street
1843		Allen, George	7, Cowper Street
1841		Allen, William	2, Morgan's Place
1850	70	Allchin, Alfred	Cole's Terrace, Islington
1853		Ambrose, John	1, Union Place, Commercial Road
1844		*Ambrose, Thomas	86, High Street, Whitechapel
1842		Anderson, Charles	23, Lower Belgrave Place
1857		Andrews, Frederick	8, Store Street
1842		Appleton, Thomas Cass	45, Curzon Street
1841		Ashton, William	154, Sloane Street
1853		Attwood, Alfred	61, Cannon Street
1841		Austin, Henry	161, Bermondsey Street
1853		Bailey, Delamore J.	30, Conduit Street
1841		Baiss, William A.	102, Leadenhall Street
1841		Baiss, James	102, Leadenhall Street
1841		Baker, William J.	21, Brecknock Place, Camden Town
1845		Ball, Thomas M.	27, St. George's Road, Southwark
1841		Balmer, John	94, St. John Street Road
1841		Barber, Thomas A.	2, Scott's Place, Islington
1842		Barber, Joseph	7, Orange Street
1856		Barkley, William	18, Little Tower Street
1848		Barnard, John	1, Oxford Terrace, Clapham Road
1853		Barnes, James B.	Trevor Street, Knightsbridge
1853		Barron, Frederick	2, Bush Lane
1841		Barry, John T.	Plough Court
1841		Bartlett, William	1, Brettin Terrace, Chelsea
1842		Bass, William F.	Gray's Inn, "3, Raymond Buildings"
1844		Bastick, William	2, Brook Street
1841		Bayley, Edmund	26, Leadenhall Street
1851		Beaton, John	174, Shoreditch
1853		Becket, William E.	6, Giltspur Street
1841		Bell, Jacob	338, Oxford Street
1853	17	*Bell, William Henderson	48, Albany Street, Regent's Park
1842		Bentley, William	11, Mount Street, Bethnal Green
1841		Best, John D.	26, Suffolk Street, Pall Mall
1841		Bigg, Thomas	Great Dover Road
1855	270	Biggs, Walter	19, Notting Hill Terrace
1842		Binge, Thomas	78, York Street, Westminster
1842		Binnington, Stephen	35, Haymarket
1841		Bird, William L.	42, Castle Street East
1850	57	Bird, Augustus	22, High Street, Kensington
1843		Blake, Charles T.	47, Piccadilly
1842		Bland, John J.	57, Penton Street, Pentonville
1841		Blandford, John F.	9, Bruton Street
1853		Bolton, William	146, Holborn Bars
1842		Bond, Henry	11, Cross Street, City Road
1853		Boothby, Henry Neal	72, Crawford Street
1842		Boully, Peter	Queen's Road, Bayswater
1849		Bourdas, Isaiah	10, Pont Street, Belgrave Square
1842		Bowden, Edward	13, Charles Street, St. James's
1852		Bower, William	96, Tottenham Court Road

Year of Admission.	No. of Certificate.	NAME.	ADDRESS.
1842		Bradley, John	10, Pont Street, Belgrave Square
1847		Brewer, Eli	43, Duke Street, Manchester Square
1857	450	*Brewer, John W. N. T.	5, Liverpool Street, City
1845		Brooks, Charles	Southville, Wandsworth Road
1853	190	Bromley, Richard M.	Denmark Hill
1853		Brotherton, William H.	1, Clyde Terrace, Caledonian Road
1842		Brown, James	27, Aldgate
1842		Buck, Thomas	Kingsland Green
1842		Buckle, Christopher P.	Gray's Inn Road
1846		*Bucklee, William H.	86, New Bond Street
1847		Bufton, Edward	122, Piccadilly
1845		*Burden, Edward	38, Duke Street, Grosvenor Square
1846		Burden, Thomas	6, Store Street, Bedford Square
1841		Burfield, Henry	180, Strand
1853		Burgoyne, James	31, Throgmorton Street
1855		Carr, John	171, High Holborn
1853		Carrick, James	46, Churton Street, Pimlico
1853		Carty, John	172, New Bond Street
1853		Cattell, George	Homerton
1842		Chapman, John	7, High Street, Islington
1853		Chard, Frederick J.	13, Eccleston Street South
1847		Charsley, Nathaniel	Brixton
1853		Chubb, James C.	59, St. John Street
1845		Clarke, Benjamin	Mare Street, Hackney
1856	181	Clarkson, James	85, Upper Street, Islington
1841		Cobb, Robert C.	10, Frederick Place, Hampstead Road
1853		*Cockrill, James	2, Wellington Street, Waterloo Town
1849		Cocksedge, Henry B.	16, Cullum Street
1852		Colchester, William M.	2, Crown Street, Hoxton
1849		Cole, William H.	16, George Street, City
1842		Coles, John	New Road, Camberwell
1854	191	Coles, Charles	72, Euston Square
1845		Collins, John R.	Haverstock Hill
1853		Collins, Robert N.	Oxford Court, Cannon Street
1841		Compton, Charles	14, Brewer Street, Golden Square
1841		Constance, William	5, Hanover Place, Regent's Park
1848		Constance, Edward	37, Leadenhall Street
1853		Cooke, John	63, High Street, Hoxton
1848		Cooper, William T.	26, Oxford Street
1853		Cooper, Robert H.	20, Royal Exchange
1847		Corfield, Daniel	22, Thrawl Street, Spitalfields
1853		Cornelius, Joseph	Clapham
1851		Couch, William O.	8, Theberton Street, Gibson Square
1848		Cowdery, George T.	36, Paternoster Row
1845		Cracknell, Charles	107, Edgware Road
1853		Cripps, John	Hammersmith
1853		Cross, Henry	4, Shepperton's Pl., New North Rd.
1841		Croucher, John T.	223, High Street, Shadwell
1853		Croyden, Charles	37, Wigmore Street
1842		Cullen, William	37, Beckford Row, Walworth
1852		Curtis, Frederick	15, Crawford Street
1842		Dakin, Joseph	248, High Street, Poplar
1853		Darby, Stephen	140, Leadenhall Street
1842		Davenport, John T.	33, Great Russell Street, Bloomsbury

Year of Admission.	No. of Certificate.	NAME.	ADDRESS.
1841		Davies, Charles	11, Claremont Place, North Brixton
1845		Davies, Henry E.	43, Wood Street, City
1853		Davis, David	47, Gerrard Street
1841		*Davy, Charles	100, Upper Thames Street
1841		Deane, Henry	Clapham
1850		Dickinson, William	16, Cambridge Street, Edgware Road
1842		Doughty, Edward William.	4, William Street, Knightsbridge
1841		Down, John	7, Coburg Place, Bayswater
1841		Drew, James	Bush Lane, Cannon Street
1845		Eade, George	39, Goswell Street
1847		Eardley, John	14, Charles St., Westbourne Terrace
1841		Eddy. Charles W.	30, Crown Street, Finsbury
1853		Edwards, William S.	14, Eltham Place, Old Kent Road
1853		Elam, Benjamin	196, Oxford Street
1853		Elkington, Edward	56, Grange Road, Bermondsey
1849		Ellis, George H.	4, Pavement, Finsbury
1853		Ellis, Scrivener W.	36, Lower Marsh, Lambeth
1853		Elvey, Thomas	8, Halkin Street, West
1841		Evans, John	60, Bartholomew Close
1851		Evans, John H.	60, Bartholomew Close
1841		Farmar, Robert A.	40, Westminster Road
1841		Faulconer, Robert H.	Keen's Row, Walworth
1853		Fells, John	Stockwell
1853		Fenn, John F.	16, Regent Street, Westminster
1841		Field, William	27, Queen's Buildings, Brompton
1856	88	*Field, James John	18, Chichester Street, Paddington
1842		Fincham, Robert	57, Baker Street
1847		Fincham, Zacariah C.	57, Baker Street
1841		Fisher, William H.	18, Conduit Street, Bond Street
1842		Foulger, Samuel	133, St. George's Street, East
1841		Fowler, Richard	14, Brewer Street, Golden Square
1841		Fox, William	48, Church Street, Bethnal Green
1856		Francis, George B.	2, High Street, Islington
1857		Francis, George	5, Park Lane
1841		Freeman, John	13, Blackfriars Road
1853		Freeman, Richard	5, Clayton Place, Kennington Road
1843		*Freeman, Robert	38, High Street, Kensington
1853		French, William A.	309, High Holborn
1853		Gadd, Charles	1, New Bridge Street, Vauxhall
1842		Gale, Henry	3, Millbrook Street, Camden Town
1854	78	Gale, Samuel	338, Oxford Street
1841		Galliers, George	Tottenham Court Road
1841		Garden, Alexander	372, Oxford Street
1843		Garden, Felix R.	372, Oxford Street
1841		Garle, John	12, Kensington Terrace
1850		*Gerard, Philip Augustus	390, Strand
1848	30	Gibbs, Nathaniel B.	1, St. John's Wood Terrace
1841		Gifford, Joseph	3, Gloucester Place, Camberwell Rd.
1848		Gigner, John	King's Road, Chelsea
1843		Gill, George W.	15, Crown Place, Walworth
1842		Glover, George	19, Goodge Street
1841		*Gloyne, Charles	5, Terrace, Kensington
1842		Goddard, John D.	6, Arthur Street, City

Year of Admission.	No. of Certificate.	NAME.	ADDRESS.
1853		Golding, William	42, Upper Albany Street
1842		Goodbarne, Thomas	13, Charles Place, Charles Square
1842		Goodbarne, Thomas R.	Hornsey Road
1853		Goode, Thomas	47, Minories
1847		Goodger, David	30, Regent Street
1853		Goosey, William	5, Ocean Row, Stepney
1853		Gorton, John G.	144, High Street, Whitechapel
1854		Gosden, Henry	140, Leadenhall Street
1856		Gould, John	Chicksand Street
1853		Gould, John Granger	198, Oxford Street [Wood
1853		Green, Josiah James	6, Henry St., Avenue Rd., St. John's
1847		Greenish, Thomas	20, New Street, Dorset Square
1851		Greenwell, Baker	St. John's Wood
1842		Griffiths, John	Clerkenwell Green
1841		Grindle, George	122, Pall Mall
1847		Grindle John	104, High Street, Borough
1853		Grisdale, John M.	216, Tottenham Court Road
1853		Gristock, Thomas	42, South Street, Manchester Square
1851		Gulliver, William	33, Lower Belgrave Street
1841		Gunton, Walter G. B.	6, New Weston Street, Southwark
1856		Guy, George H.	63, Great Russell Street, Bloomsbury
1853		Hackman, Leonard L.	24, Union Street, Bishopsgate Street
1853		Haine, John	Allen Road, Stoke Newington
1853	182	Hains, Parton John	Highgate
1857		Hall, Robert	18, Wigmore Street
1841		Hanbury, Cornelius	Plough Court, Lombard Street
1841		*Hanbury, Daniel Bell	Plough Court, Lombard Street
1857		*Hanbury, Daniel	Plough Court, Lombard Street
1846		Harding, John T.	4, Cheapside
1852		Harvey, Edward	6, Giltspur Street
1855		Haselden, Adolphus F.	18, Conduit Street
1843		Hemingway, Walter	20, Portman Street
1842		Henly, John C.	213, Upper Thames Street
1841		Henson, Matthew	Camberwell Green
1853		Henty, Henry M.	87, High Street, St. John's Wood
1841		Herring, Thomas	40, Aldersgate Street
1841		Herring, William	40, Aldersgate Street
1841		Herring, Edward	Trinity Square, Southwark
1843		Hewitt, John	1, Wellclose Street, Wellclose Square
1842		Hewlett, Charles J.	6, Arthur Street, City
1852		Hickley, Thomas P.	125, Edgware Road
1853		Hilgenberg, Henry	38, Houndsditch
1842		Hill, Arthur S.	11, Little Britain
1853		Hill, Arthur B.	11, Little Britain
1848		Hills, Thomas H.	338, Oxford Street
1852		Hockin, John B.	38, Duke Street, Manchester Square
1848		Hodgkinson, Henry	3, Newland Terrace Kensington
1852		Hogg, Robert	9, Albion Place, Hyde Park Square
1841		Hooper, William	24, Great Russell St., Covent Garden
1842		Hooper, William	7, Pall Mall East
1841		Hooper, Bartlett	43, King William Street, City
1841		Hooper, Hugh H.	22, Commerce Place, Brixton
1853		Hopkin, William K.	5, New Cavendish Street
1849		Hopkins, Thomas	16, Newgate Street

Year of Admission.	No. of Certificate.	NAME.	ADDRESS.
1851		Hopkins, Thomas B.	Tulse Hill
1853		Hora, Henry W.	58, Minories
1853	175	Horncastle, John	12, Stanhope Terrace
1841		Horner, Edward	20, Bucklersbury
1841		Horner, James T.	20, Bucklersbury
1856	41 2	Howell, Maurice	Peckham
1856	435	Howell, Thomas	61, Gray's Inn Road
1842		Hucklebridge, James M.	103, Upper Ebury Street
1841		Hudson, William B.	27, Haymarket
1843		Hughes, William P.	170, Hoxton Old Town
1853		Hugill, John	61, Cannon Street
1842		Humpage, Benjamin	51, Judd Street
1842		Hunt, Henry	1, St. George's Terrace, Gibson Sq.
1853		Hunt, James	8, New Burlington Street
1855	104	*Hunt, Richard	Brixton
1853	198	Hunt, William	Camberwell Green
1842		Huskisson, John	12, Swinton Street
1853		Huskisson, Henry O.	77, Swinton Street
1841		*Huskisson, William	12, Swinton Street
1848		Huxtable, John	104, St. John Street
1848		Huxtable, William	104, St. John Street
1853		Ingram, Robert	2, Queen's Terrace, St. John's Wood
1841		Jackson, John	47, Southampton Row
1853		Jamieson, John	49, Davies Street, Berkley Square
1855	298	Jefferson, Ebenezer W.	Stoke Newington
1845		Jeynes, George W.	42, Princess Street, Edgware Road
1845		Jeynes, Edward	49, Great James Street, Lisson Grove
1853		Jobson, Thomas C.	4, John's Row, St. Luke's
1853		Jolley, George	13, Curzon Street, Mayfair
1842		Jones, Peter	11, Norton Folgate
1849		Jones, Henry S.	Fulham Road
1842		Jones, William	34, Tavistock Place
1841		Keating, Thomas	79, St. Paul's Churchyard
1842		Kemp, Robert	2, Queen's Place, Holloway
1842		Kemp, Richard	Upper Street, Islington
1841		Kent, Thomas	226, Blackfriars Road
1848		*Kernot, George	2, Chrisp Street, Poplar
1852		Kershaw, George	113, Park Street
1853		Kettle, Joseph	42, Castle Street East
1853		Kibler, Richard C.	3, Goldsmith Row, Hackney
1853		King, Robert	21, Princes Street, Hanover Square
1853		King, Charles T.	86, Snow Hill
1855	309	Kingdon, William Y.	6, Devonshire Terrace, Notting Hill
1853		Knowles, William	Camden Town
1853		Lacy, Benjamin W.	63, Lupus Street
1842		*Langton, Frederick C.R.	226, Upper Thames Street
1850		Large, John H.	2, Holt's Place, New North Road
1853		Laugher, Charles H.	Camden Town
1853		Lavers, Richard H.	28, Old Street Road
1856		Lawrence, Henry	8, New Chapel Street, Kentish Town
1841		Lescher, Joseph S.	60, Bartholomew Close
1842		Lessey, John	97, High Street, Marylebone
1853		Lidwell, Joshua A.	46, High Street, Notting Hill

Year of Admission.	No. of Certificate.	NAME.	ADDRESS.
1853	260	Long, George	114, High Holborn
1853		Lovell, Frederick G.	10 Staverton Row, Walworth
1853		Lowe, William E.	8, Stafford Street, Bond Street
1841		*Luckombe, Charles	86, Snow Hill
1841		*Macmurdo, Edward	100, Upper Thames Street
1842		McCullock, William	95, Bishopsgate Street
1849		McCullock, Charles	Covent Garden.
1853		McDougall, William	174, Regent Street
1849		Maitland, Alexander	8, Torrington Place, Torrington Sq.
1841		Maitland, John	10, Chester Place, Hyde Park
1853		Mansell, William	Plough Court
1853		Marris, Joseph	37, Berners Street
1853		Marshall Thomas	2, Clayland's Place, Clapham Road
1853		Mason, John W.	45, Upper Marylebone Street
1853		Matland, George	10, Nassau Place, Commercial Road
1842		May, John	Battersea
1857		*Medlock, Henry	20, Great Marlborough Street
1842		Meggeson, George	61, Cannon Street
1853		Merrell, James	1, Queen's Terrace, Camden Villas
1855		Mitchell, John	12, Well's Row, Islington
1850		Moody, Henry	5, Waterloo Terrace, Regent's Park
1842		Moody, James	24, Church Street, Camberwell
1846		Moore, James L.	1, Craven Street, Westbourne Terrace
1853		Morson, Thomas	19, Southampton Row
1841		*Morson, Thomas N. R.	Queen Square, Bloomsbury
1841		Moscrop, Edward H.	144, Strand
1853		Mould, Samuel	21, Moorgate Street
1855	218	Mumford, George	5, Bathurst Street, Hyde Park
1853		Nicholls, John	3, Celbridge Pl., Westbourne Terrace
1853		Northway, John	27, Great Tower Street
1842		Oakley, George W.	35, Lamb Street, Spitalfields
1853		Ogle, William H.	Battersea
1855		Oldfield, Henry	3, Radcliff Terrace, Goswell Road
1841		Orridge, Benjamin B.	30, Bucklersbury
1853		Palmer, Robert	33, Wilton Place, Belgrave Square
1853		*Parnell, George William	3, Artichoke Place, Mile End Road
1842		Parsons, Robert	98, York Street, Westminster
1842		Pasmore, James	5, Colville Terrace, Pimlico
1853		Pattison, George	126, St. John Street Road
1853		Peacock, Hamerton R.	170, High Street, Poplar
1841		Pedler, George H.	199, Fleet Street
1852		*Penrose, Arthur Wellesley	7, Amwell Street, Clerkenwell
1853		Pepper, John	1, Bedford Street, Bedford Square
1843		Peppin, Sydenham H.	25, Princes Street, Leicester Square
1854		Phillips, John	3, Vernon Place, Bagnigge Wells Rd.
1852		Phillipson, Edward B.	116, Tottenham Court Road
1842		Philpot, Henry	32, Praed Street, Paddington
1843		Plummer, George	High Street, Peckham
1841		Pollock, Thomas	129, Fenchurch Street
1841		Portello, William	41, Stanley Street, Pimlico
1842		Potts, Robert U.	55, South Audley Street
1853		Power, John H.	Denmark Hill
1842		Preston, Joseph T.	94, Smithfield Bars

Year of Admission.	No. of Certificate.	NAME.	ADDRESS.
1852		Preston, Stanton W.	94, Smithfield Bars
1855	68	Quiller, Charles R.	15, Sloane Square
1841		Rea, Edward	115, Wardour Street
1853		Readman, Henry	18, Mortimer Street, Cavendish Sq.
1841		Redwood, Theophilus	19, Montague Street, Russell Square
1856		Reynolds, James John	15, Hanover Street
1854		Richards, James	40, New Bridge Street, Blackfriars
1845		Richardson, George	12. Norland Terrace, Notting Hill
1848		Ridsdale, James	Wakefield Terrace, Caledonian Road
1843		Roach, Pope	8, St. James's Street
1841		Rouse, Benjamin R. C.	9, Wellington Street, Southwark
1842		Rouse, Frederick J.	Clapham
1841		Rouse, Robert	1, Wigmore Street
1841		Rowland, Christopher	260, Tottenham Court Road
1857		Rowntree, Thomas	2, Arundel Place, Islington
1848		Sadler, William	13, Norton Folgate
1841		Sainsbury, Samuel	177, Strand
1843		Sandford, George W.	47, Piccadilly
1853		Saxeby, William S.	11, Tothill Street, Westminster
1853		Schacht, William	38, Houndsditch
1843		*Sharpe, George Young	6, Kensington Terrace
1842		Sharwood, James W.	98, Fenchurch Street
1841		*Shirley, John George	1, Westbourne Grove, Bayswater
1852		Simmonds, Joseph	38, Lambeth Walk
1851	89	Sims, John F.	8, Hemingford Place, Barnsbury
1854		Skidmore, John	3, Charles St. West, Westbourne Ter.
1842		Slipper, James	86, Leather Lane
1847		Smith, William F.	12, Keen's Row, Walworth
1854		Snell, Glanville A.	3, Hampton Terrace, Hampstead Rd.
1843		Solly, Stephen F.	St. George's Circus, Southwark
1842		Southwood, Thomas S.	Harrow Road
1841		*Squire, Peter	277, Oxford Street
1841		Squire, William	95, Bishopsgate Street
1841		Starkie, James	4, Strand
1849		Stead, John M.	213, Upper Thames Street
1842		Steer, Philip R.	Clapton
1854	97	Stocken, James	112, Drummond Street, Euston Sq.
1849		Stone, Thomas W.	235, Oxford Street
1850		Stuart, John E.	172, Bond Street
1853		Summers, James R.	43, Curtain Road
1841		Swire, Roger	14, Edgware Road
1854		Swire, George	Brixton Hill
1854		Taylor, John	77, Hackney Road
1853		Thomas, Henry	7, Upper St. Martin's Lane
1851		Thomas, Richard W.	10, Pall Mall
1855		Thomas, John Jabez	Stoke Newington
1845		Thompson, Henry A.	86, Chiswell Street
1841		Tonge, George	213, Upper Thames Street
1842		Towerzey, Alfred	20, Marylebone Street
1853		Townson, Thomas	Plough Court
1857		Trask, Thomas	14, Albany Street
1842		Tuck, William H.	1, Grove Street, Mile End Road
1853		Tupholme, John T.	38, Lambs Conduit Street

Year of Admission.	No. of Certificate.	NAME.	ADDRESS.
1853		Turner, Richard	2, Oxendon Street, Haymarket
1853		Tustin, Thomas H.	London Hospital
1842		Twinberrow, William	2, Edward Street, Portman Square
1852	90	Urwick, William W.	35, Denbigh Street, Pimlico
1853		Vint, James	185, Bishopsgate Street
1857	357	*Vizer, Edwin B.	63, Lupus Street, Pimlico
1841		*Wagstaff, John Henry	James Street, Westbourne Terrace
1842		Walker, Alexander	10, Ireland Row, Mile End
1842		*Walker, Henry	35, Skinner Street, Somers Town
1853		Walker, Henry	9, Suffolk Place, Islington
1853		Walker, Frederick	1, Harleyford Place, Kennington
1844		Waller, Arthur	6, Middleton Square
1845		Ward, Francis	14, Grosvenor Street
1846		*Warner, Charles Heath	55, Fore Street
1841		Watts, John	107, Edgware Road
1844		Watts, William	3, Gray's Place, Brompton
1853		Watts, William M.	32, Whitecross Street
1853		Watts, Peter	11, Sol's Row, Hampstead Road
1856	110	Watts, Henry T.	8, Victoria Road, Pimlico
1841		Waugh, George	177, Regent Street
1853		Wegg, William	10, North Place, Ball's Pond
1853		West, Richard T.	King's Road, Chelsea
1842		Westwood, William H.	16, Newgate Street
1842		Westwood, Robert	16, Newgate Street
1854	321	Wheeler, Christopher	5, Hackney Road
1841		White, John	228, Piccadilly
1841		White, Daniel	19, Terrace, Regent's Park
1852		White, Edmund	19, Terrace, Regent's Park
1848		Wickham, William	34, Tavistock Place, Tavistock Sq.
1853		Wilbe, Salmon	1, College Place, Chelsea
1842		Wilkes, George	1, Hayfield Place, Mile End
1853		Wilkinson, William	114, Lambeth Walk
1851		Williams, John	5, New Cavendish Street
1857		Williams, Thomas	54, Piccadilly
1844		Willmott, William	83, High Street, Southwark
1857		Willows, John	101, High Holborn
1853		Wilson, Thomas	Upper Holloway
1853		Windle, William	48, Portman Place
1842		Wooldridge, John	19, Bath Place. New Road
1855	364	*Wrangham, John	3, Acre Lane, Brixton
1853		Wright, William V.	11, Old Fish Street
1853		Wright, John	60, George Street, Portman Square
1853		Wright. Joseph	1, Montford Place, Kennington
1842		Wyman, John	122, Fore Street
1841		Yarde, Giles	28, Lamb's Conduit Street
1842		Yates, Benjamin	25, Budge Row, Cannon Street
1852		Young, Frederick	37, Minories
1853		Young, George	Mill Wall, Poplar

COUNTRY MEMBERS.

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1846		Abbott, John Thomas	Darlington
1853		Abraham, John	Liverpool
1852		Ackerman, Theophilus	Bristol
1845		Ackrill, George	Abergavenny
1847		Acton, George	Worcester
1853		Adams, John	Loughborough
1853		Adams, Jonathan Henry	Stoke-on-Trent
1853		Adkins, Henry James	Birmingham
1849		Ainslie, William	Edinburgh
1852		Aitken, William	Edinburgh
1849		Albright, Henry	Tottenham
1853		Alderton, John	Hastings
1853		Aldridge, Alexander John	Brighton
1852		Alexander, James	Greenock
1848		Allanson, Charles	Harrogate
1847		Allen, Thompson	Boston
1853		Allen, Adam U.	Lymington
1853		Allis, Francis	Teignmouth
1853		Alpass, Horace S.	Liverpool
1846		Althorp, James	Stamford
1842		Amoore, Charles	Hastings
1852		Anderson, James	Musselburgh
1853		Anderson, Charles Thomas	Jersey
1841		Anderson, Duncan S.	Edinburgh
1853		Andrew, William	Aberdeen
1841		Andrews, John Betts	Clare
1853		Andrews, Thomas William Cox	Norwich
1854	375	*Anness, Samuel Richard	Ipswich
1841		Anthony, Jacob	Bedford
1853		Appleby, William H.	Stockport
1853		Archer, Thomas	Southam
1841		Argles, Henry	Maidstone
1841		Armstrong, Henry	Preston
1853		Arnold, Adolphus	Guernsey
1841		Arnold, Edward	Norwich
1853		Arrandale, Elihu	Denton
1842		Arthy, Joseph	Peterborough
1853		Ascough, Jesse	Wolverhampton
1853		Ash, James Freer	Exeter
1853		Ashton, John Swan	Leicester
1853		Ashton, William	Southport
1853		Aslin, John	Sunderland
1846		Asling, Brelsford	Spalding
1855		Astley, John	Coventry
1846		Atkins, Francis Thomas	Woolwich
1842		Atkins, Francis Thomas	Deptford
1853		Atkins, Samuel Ralph	Salisbury
1853		Atkinson, Richard Marshall	Leeds
1842		*Atkinson, Stephen	Doncaster
1855	420	*Atkinson, Matthew	Manchester
1842		Attwood, George	Brompton

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1850		Aubin, James	Jersey
1842		Austen, James Battle	Banbury
1853		Bacchus, Moses P.	Portsea
1853		Backhouse, William	Leeds
1842		Badcock, John	Brighton
1844		Badcock, John	Barnard Castle
1852		Baildon, William	Edinburgh
1841		Baildon, Henry C.	Edinburgh
1853		Bailey, Richard	Penrith
1841		Bailey, William	Wolverhampton
1845		Baines, Richard	Blackburn
1841		Baker, William	Chelmsford
1850		Baker, Charles Patrick	Chelmsford
1852		Baker, William	Brentford
1842		Baker, William	Retford
1855	391	*Balkwill, Frederick Pryor	Plymouth
1844		Ball, George Vincent	Banbury
1841		Ball, Joseph	Sutton
1842		Ballard, William	Abingdon
1842		Ballard, Edwin	Faringdon
1850		Balls, George	Deptford
1845		Bally, Edward F.	Baldock
1841		Baly, Henry	Warwick
1848	12	Bancroft, John James	Ruthin
1841		Banks, Morris	Birmingham
1853		Barber, George	Liverpool
1845		Barclay, John	Falmouth
1848		Barker, Edward N.	Colchester
1842		Barker, William Henry	Biggleswade
1850		Barker, Robert	Salford
1846		Barling, Thomas	Weymouth
1853		Barlow, Samuel	Darlington
1842		Barlow, John	Manchester
1841		Barnes, James	Preston
1850		Barnett, William	Brighton
1853		Barnish, Edwin H.	Wigan
1853		Barns, Joseph	Rochdale
1853		Barritt, George	Croydon
1849		Barron, William	Cheltenham
1842		Barry, George	Northampton
1853		Barry, Edwin	Northampton
1853		Barry, James	Northampton
1853		Barstow, Charles H.	Spofforth
1853		Bartlett, William Hugh	Southampton
1842		Barton, Robert Doidge	Eastbourne
1847		Barton, Henry	Brighton
1853		Barton, Charles	Brighton
1852		Barton, William	Campbeltown
1846		Bassett, Charles	Pontypridd
1853		Batchelor, Charles	Fareham
1853		Bateman, John Bird	Manchester
1852		Bates, John	Bicester
1853		Bath, Richard C.	Morice Town
1842		Battle, John Richard	Lincoln

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1841		Baumborough, William	Wandsworth
1855	207	Baxter, William Walmisley	Bromley
1842		Baxter, William	Bromley
1853		Bayley, George E.	Andover
1841		Baynes, James	Hull
1841		Beach, Thomas	Bridport
1847		Beadon, John	Taunton
1852		Beard, James	Manchester
1853		Beaumont, William H.	Gravesend
1847		Beckett, John	Scarborough
1846		Beech, Joseph	Atherstone
1841		Beesley, Henry	Adderbury
1844		Beesley, Thomas	Banbury
1841		Bell, William D.	Leeds
1851		Bell, William	Carlisle
1853		Bell, Edward C.	Dudley
1853		Bell, Thomas	Leeds
1857		Bell, James	Manchester
1841		Bennet, William	Bath
1842		Bennett, George	Newark
1850		Bennett, John W.	Leigh, Lancashire
1853		Bentham, Thomas	Southsea
1857		Bentley, Walter	Brighton
1847		Berry, Edward	Brighton
1853		Berry, Henry James	Worthing
1853		Bettison, Joseph	Chesterfield
1854	365	Betts, George William	Spalding
1853		Betts, John	Woodbridge
1847		Bevan, Charles F.	Harwich
1853		Bew, Robert	Bilston
1842		Biggs, Robert	Bath
1852		Bingley, Thomas Gyles	Manchester
1853		Binns, Samuel	Sheffield
1848		Binsley, James	Edinburgh
1842		Birch, Thomas Edwards	Mold
1850		Bird, Ash Rudd	Ipswich
1842		Bird, Alfred	Birmingham
1842		Bird, Charles	Worcester
1841		Bishop, Robert	Eye
1849		Bishop, Thomas	Woolwich
1853		Black, James	Leven
1852		Blacklock, Henry	Bournemouth
1841		Blacklock, Joseph D.	Brighton
1842		Blackburn, Bailey	Bradford
1852		Blanchard, George	Edinburgh
1853		Blanchard, Thomas	Edinburgh
1842		Blades, Christopher	Leek
1846		Blades, Holland	Nantwich
1842		Blades, Sheriff	Northwich
1845		Blackshaw, Thomas	Burslem
1856		Blake, William F.	Stroud
1853		Blamires, Samuel	Bradford
1857		Bland, John Handel	Stourbridge
1848		Bloor, Joseph	Derby

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1853		Blunt, Thomas	Shrewsbury
1842		Boast, Thomas	York
1842		Bolton, Thomas	Tenterden
1853		Bomford, Esau	Witney
1853		Bond, Laurence V.	Tiverton
1842		Bond, John	Great Yarmouth
1850		Bond, Charles	Leamington
1842		Bond, John	Minehead
1848		Boocock, John	Leeds
1852	116	Boorne, Charles	Bristol
1853		Booth, James	Blackburn
1842		Booth, John	Heckmondwicke
1853		Booth, Thomas Buckley	Eccles
1841		Booth, James	Rochdale
1853		Booth, Aaron	Manchester
1853		Bostock, William	Ashton-under-Lyne
1855	304	Botham, William	Manchester
1842		Bottle, Alexander	Dover
1849		Bowen, Henry F.	Harrow
1843		Bowers, Thomas	Chester
1847		Bowers, James D.	Chester
1841		Bowerbank, Joseph	Cockermouth
1853		Bowerbank, Fawcett	Cockermouth
1853		Bowker, James	Manchester
1853		Bowles, Charles A.	Chester
1853	257	*Boyce, John Pierce	Windsor
1841		Boyce, John Pierce	Chertsey
1842		Braddock, William	Oldham
1856	411	*Brady, Henry B.	Newcastle-on-Tyne
1853		Bragg, William B.	Market Harborough
1842		Brailey, Charles B.	Heavitree
1849		Bramwell, George	Liverpool
1853		Brandreth, John	Preston
1853		Brandreth, Lawrence	Preston
1842		Brayshay, William Bolam	Stockton
1842		Breary, William A.	Douglas
1846		Bremner, William	Thurso
1845		Brend, Thomas	Swansea
1852		Brereton, John	Manchester
1842		Brew, Thomas Archer	Brighton
1842		Brewster, William	Cambridge
1853		Brierly Richard	Stalybridge
1842		Briggs, James	Tipton
1853		Briggs, George	Goole
1843		Bright, Philip	Brecon
1853		Bright, William	Bath
1850		Brimelow, Thomas	Farnworth
1853		Bromfield, William	Crewe
1853		Bromfield, Charles	Exeter
1848		Bromley, Charles	Liverpool
1853		Brothers, William	Folkestone
1846		Brown, William	Dunfermline
1852	121	Brown, David R.	Edinburgh

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1850		Brown, Thomas	Lutterworth
1842		Brown, Charles	Belper
1846		Brown, Leonard Flintoff	Manchester
1845		Brown, William Scott	Manchester
1853		Brown, Thomas Dudley	Coventry
1853		Brown, Samuel	Spilsby
1853		Brown, Thomas	Tyldesley
1853		Brown, Thomson	Glasgow
1853		Brown, George	Selby
1844		Brown, John	Eccles
1853		Brown, Alfred James	Halstead
1853		Brumwell, George	Monkwearmouth
1853	226	Bryce, James	Dunfermline
1847		Bryant, William	Huntingdon
1846		Buck, William	Colchester
1853		Buck, Richard C.	Dudley
1853		Bullus, William	West Bromwich
1853		Bunn, Charles	Nayland
1842		Burdon, John	Durham
1848		Burdwood, James	Plymouth
1851		Burgess, William	Northwich
1853		Burns, James Adam	Stirling
1846		Burne, Robert Thomas	Houghton-le-Spring
1853		Burnett, Robert	Frazerburgh
1853		Burrell, George	Montrose
1852		Burrow, Walter B.	Great Malvern
1853		Burrow, John Severn	Great Malvern
1853		Bustin, William	Shotley Bridge
1852		Butcher, Thomas	Cheltenham
1841		Butler, Samuel	Bristol
1841		Butler, William	Wycombe
1853		Butler, Thomas E.	Leicester
1856	379	Butler, John S.	Liverpool
1841		Butterfield, James Morse	York
1849		Bwye, George	Cheshunt
1853		Caddick, John	Newcastle-under-Lyne
1853	77	Caley, Albert Jarman	Norwich
1849		Calvert, Robert	Stokesley
1842		Calvert, James	Belper
1846		Campbell, Donald	Glasgow
1852	122	Carmichael, Lauchlan	Edinburgh
1842		Carr, William	Leicester
1841		Carr, William Graham	Berwick
1844		*Carran, Thomas	Peel, Isle of Man
1853		Carruthers, Richard Birrell	Dumfries
1844		Cartwright, William	Newcastle-under-Lyne
1850		Carter, William	Manchester
1853		Chamberlin, William	Leicester
1842		Chantry, George	Goole
1855	62	Chaplin, John Lambert	Colchester
1846		Chaplin, Alfred	Lewes
1853		Chapman, Henry	Ipswich
1853		Chapman, William	Ipswich

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1853		Chapman, Henry	Clifton
1849		Chapman, Richard J.	Chipping Ongar
1841		Chapman, John Cook	Congleton
1853		Chapman, John	Tring
1853		Chapman, William	York
1853		Chapman, William Fox	Hull
1842		Chapman, Edward	Hull
1851		Chaston, Robert	Lowestoft
1841		Chater, Jonathan	Watford
1853		Chaundy, Thomas G.	Oxford
1842		Chave, John Anstey	Uxbridge
1856	178	Chenery, William H.	Ipswich
1851		Cheshire, John	Grantham
1853		Childs, Joseph Linington	Portsmouth
1842		Chipperfield, Robert	Shirley
1851		Christian, Francis	Birmingham
1842		Christopher, William	Crickhowell
1853		Churchill, John	Birmingham
1856		Churchouse, William B.	Chard
1855	244	Clark, William W.	Dorking
1853		Clark, William	Longsight
1853	334	Clark, Robert	Devizes
1847		Clarke, William	Durham
1845		Clarke, John Webster	Leicester
1841		Clarke, Joseph	York
1853		Clarke, Benjamin Joseph	Cheltenham
1846		Clarke, Thomas Meadows	Richmond
1856		Clarke, Thomas	Somerton
1853		Clater, Francis	Retford
1841		Clay, Robert	Liverpool
1854	201	Clayton, John Oates	Leeds
1853		Clennell, John Morton	Newcastle-on-Tyne
1849		Clift, Edward	Lewisham
1845		*Coates, William	Leeds
1853	123	Cobb, John S.	Yarmouth
1852		Cochrane, Thomas	Falkirk
1853		Cock, John	Shipdham
1842		Cocking, George	Ludlow
1853		Cockton, John	Maryport
1841		Colbeck, George Royde	Leamington
1845		Cole, Edward Charles	Calne
1848		Cole, Walter Thomas	Weymouth
1853		Cole, John	Whittlesea
1841		Coleman, James	Cardiff
1853		Collier, William	Sheffield
1846		Collier, William	York
1849		Collings, William Henry	Bristol
1852		Colton, Thomas	Selby
1853		Commans, Robert Dyer	Bath
1853	185	Connacher, David	Mackinch
1853		Constable, Edwin	West Bromwich
1842		Conway, William	Pontypool
1847		Cooling, John	Newark

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1850		Cooper, George Brown	Brightlingsea
1852		Cooper, James Robert	Birmingham
1841		Cooper, Thomas	Leicester
1845		Cooper, Mark Ward	Bridlington
1841		Cooper, George	Exeter
1841		Cooper, James Newbury	Clifton
1845		Cooper, Thomas	York
1853		Cooper, Lewis	Reading
1842		Corbyn, Joseph B.	Beccles
1853		Corfield, Thomas J. T.	St. Day
1843		Cornelius Richard Bussell	Teignmouth
1845		Cornish, Henry Roberts	Penzance
1843		Cornish, William	Brighton
1841		Corrie, Charles	Bedford
1841		Cortis, Charles	Worthing
1853		Cottee, William	Salford
1853		Cotterell, William Henry	Dover
1841		Cotton, Gilbert Knill	Barnstaple
1853		Coupland, Henry	Liverpool
1853		Coupland. Joseph	Harrogate
1842		Cousins, Thomas George	Oxford
1842		Coverley, John	Scarborough
1845		Cowell, Silas	Canterbury
1845		Cowgill, Brian Y.	Burnley
1841		Crafton, Ralph Caldwell	Croydon
1842		Craske, Samuel	Holt
1853		Crarer, John	Blairgourie
1853		Crick, George Edward	Maldon
1842		Critchley, John	Blackburn
1842		Crocker, Henry Radcliffe	Brighton
1853		Crofts, Holmes Cheney	Chatham
1852	124	Croley, William	Edinburgh
1842		Cronshey, James	Thetford
1841		Crook, George	Farnham
1841		Cropper, James	Long Sutton
1847		Cross, William Gower	Shrewsbury
1853		Croskell, Charles	York
1853		Crowe, Henry Joseph	Tredegar
1853		Crowder, Charles H.	Hull
1846		Crowther, Thomas	Tickhill
1851		Cuff, Robert C.	Bristol
1852		Cumbers, John	Wandsworth
1853		Cumine, Frederick H.	Southport
1841		Cupiss, Francis	Diss
1853		Currie, John	Glasgow
1854	273	Cuthbert, John Mason	Bedford
1842		Cutting, James Bray	Leamington
1848		Cutting, Thomas	Selby
1853		Cutts, Thomas	Basford
1842		Dale, George	Chichester
1844		Dale, William James	Portsea
1855		Dance, William D.	Stourport

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1853		Dandie, David	Perth
1855	126	Dandie, Robert	Perth
1850		Davenport, Edward	St. Alban's
1846		Davidson, John	Berwick
1853		Davidson, Charles	Aberdeen
1853		Davies, Thomas	Cheltenham
1853		Davies, John L.	Hay
1853		Davies, Peter Hughes	March
1853		Davies, William Henry	Pillgwinlly
1842		Davies, Richard Morgan	Carmarthen
1841		Davis, John	Dorchester
1841		Davis, Robert	Dorchester
1845		Davis, John Oliver	Folkestone
1843		Davis, John Oliver, jun.	St. Leonard's
1841		Davis, D. Francis	Leominster
1841		Davis, Henry	Leamington
1842		Davis, Francis	Newbury
1845		Davison, Ralph	York
1842		Davy, Henry	Wiveliscombe
1854		Dawe, Sampson	Monmouth
1853		Dawson, Thomas	Preston
1853		Dawson, Stanhope	Deptford
1853		Day, George	Blackheath
1852		Deacon, George F.	Beccles
1853		Dearlove, Thomas D.	Brackley
1845		Death, John William	Brompton
1853		De Bois, Frederick	Glasgow
1853		De Carle, Joseph Parkinson	Modbury
1853	194	Deck, Arthur	Cambridge
1845		Dennison, Matthew	Dudley
1853		Densham, John B.	Plymouth
1852		Dewar, Peter S.	Dingwall
1842		Dexter, James	Eastbourne
1842		Dickerson, Henry	Devonport
1845		Dickins, Richard	Aylesbury
1847		Dingley, Richard Loxley	Evesham
1853		Dixon, Benjamin	Norwich
1854	381	*Dixon, William	Southampton
1842		Dobinson, William	Sunderland
1853		Dobson, James	Keswick
1847		Dodman, Robert	Thorney
1842		Dodshon, Edward	Sunderland
1852		Done, John	Manchester
1850		Dores, James	Alnwick
1855		Doughty, Richard	Bushey
1853		Dowdeswell, Peter	Staunton
1842		Dowell, William Cuming	Bristol
1845		Dowman, George	Southampton
1847		Down, Richard Haydon	Torpoint
1853		Downes, Joseph	Greenhithe
1852		Dowthwaite, William	Barnet
1841		Drage, William F.	Birmingham
1841		Dresser, Richard	York

Year of Admisssion.	No. of Certificate.	NAME.	RESIDENCE.
1853		Drew, John	Pershore
1842		Dron, William	Kirkcaldy
1841		Duck, Daniel	Guisborough
1846		Duckett, Joseph B.	Bradford
1846		Dudden, Richard M.	Midsomer Norton
1852		*Dudgeon, George	Nottingham
1842		Duggan, Henry	Hereford
1853	184	Duncan, William	Rothesay
1841		Duncan, John	Edinburgh
1842		Duncan, Frederick MacRae	Sandwich
1842		Dunhill, William	Doncaster
1853		Duprey, Jean A. B.	Jersey
1853		Durant, Frederick	Dorking
1853		Durant, Edmund	Dorking
1847		Dutton, John	Birkenhead
1842		Dutton, George	Bolton
1853		Dyer, John	Margate
1842		Dyer, Thomas	Exeter
1853		Dyer, William	Halifax
1842		Dyson, John	Andover
1853		Eastes, Thomas Henley	Dover
1853		Edgar, James	Henley-on-Thames
1853		Edmonds, Benjamin M.	Lowestoft
1853		Edwards, James	Leicester
1848	22	*Edwards, John Baker	Liverpool
1853		Edwards, William	Sidmouth
1850		Edwards, Henry	Lincoln
1842		Edwards, George	Dartford
1853		Edwards, William	Denbigh
1853		Ekins, William	Huntingdon
1842		Ellaby, John	Melton Mowbray
1842		Ellis, Benjamin	Shepton Mallett
1853		Ellis, William	Abergele
1849		Ellis, Richard	Thornbury
1841		Ellison, John	Liverpool
1845		Elsey, John	Horncastle
1856		Elsey, Charles	Market Rasen
1847		Ely, George	Bingham
1843		*England, William Paul	Huddersfield
1848		Ereaut, John	Jersey
1853		Ereaut, George	Jersey
1853		Etherington, Thomas G.	Brighton
1846		Etherington, Joseph	Bishop's Auckland
1851	43	Evans, Thomas	Liverpool
1842		Evans, Edward	Liverpool
1842		Evans, Thomas B.	Liverpool
1854	47	Evans, Henry S.	Liverpool
1842		Evans, John	Hemel Hempstead
1853		Evans, Samuel	Caerphilly
1853		Evans, William Luke	Cardiff
1853		Evans, John	Narberth
1847		Evans, Thomas	Aberdare

Year of Admission.	No. of Certificate.	NAME	RESIDENCE.
1853		Evans, William Downing	Newport, Monmouth
1853		Evinson, Thomas	Chesterfield
1842		Eyre, Alfred B.	Ipswich
1842		Eyre, Thomas S.	Launceston
1844		Fairbank, James Hack	Woolwich
1857		Fairbarn, George	Liverpool
1853		Fairley, Thomas	Sunderland
1853		Falkner, Richard	Banbury
1853		Farie, Gilbert	Bridge of Allan
1842		Farmer, John	Putney
1847		Farmer, James	Castle Donington
1853		Farnworth, William	Blackburn
1853		Farrage, Robert	Rothbury
1850		Farrant, Henry	Ottery St. Mary
1842		Farrant, Robert	Salisbury
1854	69	Farrer, John Daniel	Chester
1853		Farrow, William	Woburn
1842		Fergusson, John	Liverpool
1842		Fielder, Thomas	Warminster
1842		Finch, John	Cheltenham
1846		Finch, Jacob	Swaffham
1852		Finlayson, Thomas	Leith
1851		Fisher, John Thornhill	Torquay
1853		*Fisher, Henry Christopher	Torquay
1853		Fiske, Charles	Ipswich
1843		Fitch, Robert	Norwich
1842		Fitt, Edward	Barking
1841		Fleeming, William	Wolverhampton
1842		Fletcher, Francis	Cheltenham
1849		Fletcher, Cornelius	Nottingham
1853		Flinn, John James	Liverpool
1841		Flockhart, William	Edinburgh
1853		Flower, Thomas S.	Matlock—Bath
1842		Foggitt, Thomas Jackson	Thirsk
1841		*Forbes, William	Reigate
1853		*Forge, Christopher	Bridlington
1853		Forman, George	Birmingham
1853		Forrest, Richard William	Gainsborough
1853		Forster, John	Whitehaven
1853		Forster, John	Sunderland
1853		Forsyth, William	Aberdeen
1841		Foster, Frederick	Brighton
1853		Foster, Alfred Hood	Birmingham
1841		Foster, Joseph	Collumpton
1845		Foster, James Fawcett	Hull
1842		Foster, Edward	Ludlow
1853		Foster, John	Uckfield
1855		Foster, George Pitt	Tetbury
1842		Foulds, William	Chowbent
1846		Fowke, George	Stafford
1853		Fowler, Edward	Bedale
1853		Fowler, Henry	Torrington

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1849		Fox, Charles James	Witney
1853		Foxcroft, Elijah	Skipton
1842		Francis, George	Great Baddow
1853		Franks, Alfred	Ramsgate
1853		Fraser, Charles	Largs
1853		Frazer, Daniel	Glasgow
1853		Freeland, John	Barrhead
1844		Freestone, Thomas Morris	Bristol
1841		French, Gabriel	Chatham
1849	3	French, Joseph B.	Chatham
1853		Fresson, Lewis Francis	Stevenage
1842		Froom, William Jacob	Brighton
1851		Frost, William Henry	Collumpton
1841		Fryer, Henry	Huddersfield
1851		Funnell, William Henry	Brighton
1849		Furmston, Samuel C.	Dartford
1853		Gall, Benjamin D.	Woodbridge
1842		Gamble, Richard	Grantham
1841		Garbutt, Cornelius	Gateshead
1853		Garbutt, Cornelius D.	Gateshead
1842		Gardener, Charles	Tunbridge Wells
1841		Gardner, James	Edinburgh
1853		Garland, William	Leeds
1846		Garlick, Thomas H.	Halifax
1853		Garlick, John	Hollinwood
1853		Garnett, Joseph	Newcastle-on-Tyne
1851		Garnham, Barrington	Brighton
1842		Garratt, John Colpman	Rugby
1856		Garratt, Samuel	Rugby
1842		Garside, Burdett	Southport
1842		Gay, George	Stroud
1853		Geake, John	St. Columb
1846		Geldard, John	St. Austell
1842		Geldard, Richard Kelly	Plymouth
1853		Gerrard, Joseph	Longton
1841		Gibbons, William	Plymouth
1852		Gibbs, William	Ryde
1851		Gilbert, George	Portsea
1847		Gilpin, Benjamin	Newcastle-on-Tyne
1847	37	*Giles, Richard William	Clifton
1841		Giles, Richard Bobbet	Clifton
1842		Gill, Samuel	Pendleton
1841		Gilkes, William	Leominster
1856	433	Gissing, Thomas W.	Wakefield
1844		Glaisby, John	York
1841		Glaisyer, Thomas	Brighton
1852	71	Glanfield, George	Torquay
1853		Glasier, Samuel	Manchester
1853		Glew, William	Selby
1850		Glover, Samuel	Liverpool
1841		Gloyne, Thomas Hadfield	Dewsbury
1845		Glynn, William	Torquay
1848		Goadsby, Thomas	Manchester

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1845		Goddard, Henry Edward	Great Yarmouth
1842		Goddard, Joseph	Leicester
1842		Goodall, Thomas	Ensham
1841		Goodall, John	Newcastle-on-Tyne
1850		Goodall, Henry	Derby
1841		Goode, Thomas	Congleton
1857	79	Goode, Charles	Congleton
1853		Goodrich, George	Dursley
1845		Goodson, Joseph	Beeston
1842		Gordelier, Paul William Gibbs	Sittingbourne
1853		Gordon, John	Edinburgh
1853		Goss, Samuel	Barnstaple
1853		Gostling, Thomas P.	Diss
1853		Gould, Frederick	Kingston-on-Thames
1855		Govan, Alexander	St. Andrews
1841		Gow, Alexander	Wolverhampton
1852		Grant, John S.	Edinburgh
1852	130	Gray, Alexander F.	Edinburgh
1852	131	Gray, John	Cupar, Angus
1848		Gray, William	Rothwell
1853		Gray, Charles	Bilston
1853		Greaves, Abraham	Ironville
1844		Greaves, John	Bakewell
1853		Greaves, William	Charwell
1842		Greaves, Richard	Ripon
1853		Green, Robert Poynton	Witham
1853		Green, George	Selby
1848		Green, John	Birkenhead
1853		Green, William M.	Liverpool
1842		Green, William	Bath
1854	245	Green, James	Droitwich
1853		Greenhill, John Russell	Norwich
1853		Greenough, George	Manchester
1849		Greenwell, William C.	Gateshead
1848		Greenwood, John	Harrogate
1853		Gregory, Edward James	Cheltenham
1853		Greig, William	Glasgow
1852		Griffith, Robert	Carnarvon
1844		Griffith, Charles	Weston-super-Mare
1846		Griffith, Richard	Slough
1853		Griffiths, John	Manchester
1853		Griffiths, John	Narberth
1853		Griffiths, William	Swansea
1855	18	*Grindley, Robert D.	Chester
1853		Groom, William Bishop	Liverpool
1852		Grounds, George Field	Bishop Stortford
1842		Grounds, Ambrose	Ludlow
1841		Groves, Simon	Blandford
1854	95	Groves, Wellington E.	Blandford
1853	103	Groves, Thomas Bennett	Weymouth
1853		Groves, Edward	Hammersmith
1852		Grundy, Edwin	Lenton
1853		Gudgeon, George B.	Kimbolton

Date of Admission	No. of Certificate.	NAME.	ADDRESS.
1842		Gulliver, Walker Job	Lutterworth
1842		Gundry, William	Bristol
1842		Gunner, George	Winchester
1841		Gurnell, Thomas	Dartford
1846		Guy, Guy	Helstone
1841		Gwatkin, James Thomas	Brighton
1852		Gwillim, John Cole	Newport, Monmouth
1853		Hadfield, John	Congleton
1841		Hadfield, William	Congleton
1853		Hadfield, William P.	Newark
1853		Hadfield, Frederick B.	Bury St. Edmunds
1850		Hagley, William Thomas	Ilminster
1852		Haigh, Joseph	Leeds
1842		Haines, John Jenkins	Bromsgrove
1853		Hale, Jacob H	Bristol
1843		Hall, Joseph	Salford
1852		Hall, Thomas	Newcastle-on-Tyne
1848		Hall, Thomas Slocombe	Truro
1852	4	Hall, John Richard	Canterbury
1853		Hall, Richard	Brecon
1853		Hall, Henry R. F.	Hull
1853		Hall, Robert	Exeter
1842		Hall, George	Huddersfield
1842		Hall, John Dean	Wycombe
1853		Hall, John Eaton	Southampton
1849		Hall, Thomas	Grantham
1849		Hallam, Edward	Axbridge
1842		Hallsworth, Thomas	Manchester
1850		Ham, Charles H	Exeter
1853		Ham, John	Nether Stowey
1841		Hambrook, Odden	Dover
1857		Hambrook, John B.	Dover
1853		Hamer, John	Manchester
1853		Hamilton, Julius	Poole
1846		Hammon, Richard	Folkestone
1855	383	Handley, John	Wakefield
1853		Hannell, Edward W.	Chesterfield
1853	230	Hardie, James	Dundee
1853		Harding, James John	Sudbury
1853		Hardman, Thomas B.	Liverpool
1853		Hare, Josiah William	Harleston
1852		Hargreaves, Henry	Oldham
1842		Harold, William	Battle
1842		Harper, Henry	Leamington
1853		Harrington, Richard B.	Rayleigh
1852		Harrington, Arthur	Rochford
1854	203	Harris, William Harry	Northampton
1853		Harris, Daniel Roteley	Ware
1853		Harris, Joshua	Teignmouth
1853		Harrison, Thomas	Leeds
1842		Harrison, Thomas	Bradford
1842		Harrison, James Parker	Carlisle
1847		Harrison, Thomas	Nottingham
1847		Harrison, John	Nottingham

Year of Admission.	No. of Certificate.	NAME.	ADDRESS.
1848		Hart, James	Bolton
1852		Hart, Hugh	Glasgow
1853		Hart, George William	Hull
1841		Hartland, James	Bristol
1853		Hartley, Robert	Manchester
1853		Hartshorn, William H.	Ironbridge
1853		Hartshorn, Thomas	Ironbridge
1841		Harvey, Thomas	Leeds
1843		Harvey, John	Newark
1851		Harwood, John	Putney
1842		Haselar, Albert	Cranbrook
1848		Hatfull, Robert	Deptford
1853		Hatrick, Robert R.	Paisley
1853		Hatrick, William	Paisley
1842		Hattersley, John	Barton-on-Humber
1853		Hawkins, Henry Ford	Rugeley
1847		Haydon, Frederick Walter	Fordingbridge
1842		Haydon, Henry William	Dawlish
1853		Hayman, Alfred	Neath
1853		Hayward, Samuel H.	Gloucester
1845		Hayward, William G.	Reading
1845		Hayward, Edward	Ipswich
1853		Hayward, Charles	Manchester
1847		Hazell, Robert W.	Maidstone
1842		Head, John	Lewes
1842		Headley, Morris	Bridlington Quay
1846		Heald, William	Sleaford
1853		Healey, Samuel George	Hull
1841		Heath, Edward	Cromer
1845		Heathcote, Thomas Sarl	Newcastle-under-Lyne
1847		Heaton, John Scholes	Manchester
1841		Hedderley, John	Nottingham
1853		Hedderley, Samuel	Nottingham
1842		Hellowell, Daniel	Leeds
1856	231	Helmrich, William	Ayr
1853	285	Heming, Robert	Sunderland
1842		Hemming, Richard George	Worcester
1848		Hempsted, Robert	St. Leonard's
1853		Henderson, John	Glasgow
1853		Henley, Henry	Lyme Regis
1853		Henshall, John	Congleton
1853		Henthorn, Joshua	Oldham
1852		Hepworth, William	Manchester
1853		Herington, Joseph	Leighton Buzzard
1845		Hern, William Henry	St. Austell
1853		Hewett, William Henry	Great Yarmouth
1853		Hewlins, Edward	Leatherhead
1842		Hibbert, Walter	Neath
1845		Hick, Matthew Bussey	Wakefield
1846		Hick, Allan	Wath
1845		Hick, Joseph	Bradford
1842		Hickman, Joseph Frederick	Newbury
1852		Hicks, Robert	Lerwick
1853		Hicks, George	Rothesay

Year of Admission.	No. of Certificate.	NAME.	ADDRESS.
1853		Hifley, Richard James	Devonport
1853	96	Higgins, Thomas S.	Huddersfield
1843		Higgins, William	Chester
1842		Higgs, John Seagrave	Market Harborough
1842		Highway, Henry	Walsall
1849		Hill, Lawrence	Sherborne
1853	192	Hill, Charles William	Burnley
1842		Hill, Richard	Bruton
1853		Hill, William	Manchester
1853		Hill, Simon	Plymouth
1841		Hill, John	Sheffield
1854	246	Hill, Thomas	Deddington
1851		Hillyard, Samuel F.	Long Sutton
1853		Hinchcliffe, Ferrand G. U.	Manchester
1853		Hincks, Thomas R.	Chester
1853		Hincton, Charles Fox	Plymouth
1853		Hinds, James	Coventry
1853		Hine, Alfred	Beaminster
1842		Hitchcock, Charles Edmund	Colchester
1842		Hitchcock, William Richards	Taunton
1853		Hobson, Charles	Beverley
1853		Hoddy, Benjamin	Coggeshall
1852	133	Hodgeton, David	Brechin
1841		Hodgson, Edward	Stockton
1853		Hodkinson, Henry	Macclesfield
1853		Hogg, Henry	Bristol
1853		Hogg, Thomas	Bideford
1844		Holden, James	Leeds
1853		Holden, Richard	York
1842		Holdsworth, Mark	Horncastle
1853		Holdsworth, Thomas W.	Birmingham
1853		Holland, William Charles	Lincoln
1854		Holland, William	Market Deeping
1841		Hollick, Thomas	Chatham
1841		Hollier, Elliott	Dudley
1843		Holt, George Palmer	Bexley Heath
1853		Holt, Richard Wylde	Seacombe
1842		Holtum, Edward	Canterbury
1842		Holyoake, William	Manchester
1853	13	Hooker, Thomas E.	Wellington
1852		Hooker, James	Manningtree
1842		Hooper, Henry	Brighton
1853		Hopper, Richard	Sunderland
1841		Hopwood, Henry J. S.	Richmond, Surrey
1841		Horncastle, Henry	Sheffield
1841		Horner, Stephen	Hartlepool
1845		Hornsby, John Harwood	Odiham
1857		Hornsby, George G.	Brighton
1853		Horsey, James	Portsea
1853		Horsfield, John Morell	Prestwich
1851		Houghton, James	Liverpool
1853		Houghton, Thomas	Oxford
1856		Houlton, James	Wetherby
1841		Howard, Robert	Stratford-le-Bow

Year of Admission.	No. of Certificate.	NAME.	ADDRESS.
1853		Howard, John Eliot	Stratford-le-Bow
1853		Howard, Richard	Tunbridge Wells
1842		Howard, John	Manchester
1842		Howman, Philip	Winchcombe
1846		Howorth, James	Doncaster
1853		Howroyd, Joseph	Salford
1855		Howson, Thomas J.	Gateshead
1851		Howson, Thomas B.	Oxford
1853		Hubbard, Robert William	Kenilworth
1842		Hudson, Richard	Kendal
1851	10	Huggins, George Thomas	Barnet
1849		Hughes, Edward	Altrincham
1842		Hughes, Samuel	Stourbridge
1842		Hulbert, Robert Skeat	Basingstoke
1853		Hulme, John Hughes	Norwich
1853		Hulme, Thomas	Oldham
1842		Humphreys, Matthew	Nottingham
1842		Humphreys, Thomas	Birmingham
1851		Hunt, Thomas	Croydon
1852	135	Hunter, David	Edinburgh
1853		Hunter, John	Gosport
1842		Huntley, John	Wimborne
1855		Hurdon, James	Appledore
1853		Hurman, John	Bridgewater
1844		Hurst, William T. H.	Abergavenny
1842		Hurst, John	Louth
1845		Husband, Matthew	Exeter
1851		Hutchinson, James	Manchester
1853		Iliffe, Thomas	Nuneaton
1853		Ingham, Henry	Wellingore
1853	306	Isaac, George Washington	Bristol
1852		Iverach, William	Kirkwall
1854	136	Jaap, John	Glasgow
1850		Jackson, William R. P.	Ewell
1842		Jackson, William George	Hartlepool
1841		Jackson, Thomas	Manchester
1849		Jackson, Robert	Manchester
1852		Jackson, Robert R.	Liverpool
1852	105	Jackson, William	Stowmarket
1853		Jackson, John	Morley
1853		Jackson, Henry	Liverpool
1853		Jackson, Clay	Chesterfield
1853		James, John Parry	Cardiff
1853		James, Henry	Bognor
1842		James, John	Truro
1853		Jameson, Walter C.	Bath
1853		Jefferson, Peter	Leeds
1853		Jeffery, Russell	Cheltenham
1848		Jeffery, Moses William	Devonport
1846		Jenkins, Henry Maine	Christchurch
1853		Jenkins, John	Peterchurch
1841		Jenner, Richard B.	Sandgate
1855	286	Jennings, John Edgell	Southampton
1841		Jennings, William	Halifax

Year of Admission.	No. of Certificate.	NAME.	ADDRESS.
1842		Jennings, Reginald	Hereford
1853		Jennings, John E. H.	Sheffield
1853		Jessop, Jonathan	Halifax
1853		Jewison, Robert	Thorne
1842		Job, Richard Osman	Truro
1852		Jobson, William	Dundee
1853		Johnson, Thomas	Leek
1841		Johnson, John H.	Liverpool
1853		Johnson, John B.	Uttoxeter
1841		*Johnson, Samuel	Liverpool
1853		Jones, John	Aberdare
1842		Jones, Edward Bowen	Carmarthen
1845		Jones, Samuel Urwick	Leamington
1845		Jones, John	Holywell
1842		Jones, William	Liverpool
1853		Jones, David	Narberth
1853		Jones, Owen Lewis	Liverpool
1848		Jones, Charles	Birkenhead
1853		Jones, Ellis Powell	Rhyl
1848		Jones, James	Salford
1841		Jones, Charles	Hanley
1853		Jones, Thomas J.	Newport
1841		Jones, William B.	Kingston-on-Thames
1853		Jones, William Thorpe	Southwell
1844		Jones, Oliver Ellis	Welshpool
1853		Jones, Thomas	Welshpool
1850		Jones, William A.	Waterloo
1857	115	Joy, Francis William	Cardiff
1842		Judson, Thomas	Ripon
1846		Jull, Thomas	Romford
1853		Keall, Powell Skinner	Bristol
1845		Keeling, George Ratcliffe	Epsom
1852		Keene, Alfred ..	Leamington
1853		Keith, James	Aberdeen
1852	137	Kemp, David	Portobello
1841		Kemp, Grover	Brighton
1854		Kemp, John	Brighton
1848		Kemp, William	Horncastle
1841		Kendall, Frederick	Stratford-on-Avon
1844		Kendall, George	Masham
1853		Kennedy, William	Glasgow
1853		Kent, Alfred	Iffley
1851		Kenwrick, Edwin C.	Birmingham
1853		Ker, Thomas Foster	Manchester
1852		Kerr, Thomas	Edinburgh
1853		Kernick, Samuel Penrose	Cardiff
1843		Kernot, Joseph	Naples
1843		Kernot, Septimus	Naples
1853		Kershaw, Joseph	Manchester
1847		Kershaw, James	Southport
1842		Kiddy, Samuel	Belper
1841		Kimbell, Henry	Knowle
1853		Kimberly, George	Bilston
1841		Kinch, Charles	Henley-on-Thames
1853		King, William George	Market Drayton

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1841		King, Thomas Simmons	Rochester
1853		King, William	Soham
1853		King, Charles Montague	Southend
1853		King, Ellis	Southend
1842		King, Joseph R.	Bath
1854	276	Kirk, John	Maidstone
1853		Kirk, Charles	Hartley Row
1853		Kirk, Thomas	Liverpool
1853		Kirkbride, William	Penrith
1842		Kirton, Joseph Bishop	Hull
1842		Kitching, Charles	Haverhill
1853		Knapman, John	Exeter
1842		Knight, Edward Sackville	Bridport
1843		Knight, Alfred	Cirencester
1841		*Knott, Thomas	Exeter
1844		Knowles, Richard John	Demerara
1852		Knowles, John J.	Sandwich
1853		Lacy, John	Reepham
1853	187	Laird, William	Dundee
1853		Lamotte, Thomas Gallye	Bristol
1853		Lancaster, Henry	Croydon
1842		Land, John	Leeds
1842		Langford, William	King's Lynn
1843		Lansdale, Ralph	Wycombe
1841		Large, Henry	Nottingham
1853		Lasham, John	Dedham
1841		Lathbury, Robert	Liverpool
1842		Lavers, Thomas Howard	Lewisham
1855	378	*Lavington, Edwin	Bristol
1853		Law, William	Forfar
1842		Lea, Henry Clairmont	Hastings
1853		Lea, Samuel	Ellesmere
1841		Lea, John Wheeley	Worcester
1853		Leach, William	Ashton-under-Lyne
1855		Leadbetter, William Austin	Melton Mowbray
1841		Leay, Joseph	Birmingham
1846		Leggatt, John Tudway	Wareham
1853		Leighton, John H.	Durham
1852		Leith, James	Edinburgh
1853	138	Lever, William	Hastings
1853		Lewin, Edwin C.	Boston
1841		Lewin, William	Plymouth
1853		Lewis, Thomas V.	Ebbw Vale
1856	310	Lewis, Thomas Cooper	Rugby
1841		Lindsay, Robert	Edinburgh
1857	406	Lingwood, James Grace	Northampton
1841		Lines, George	Hertford
1849		Linsley, Thomas	York
1844		Lister, George	Cottingham
1854	215	Littlefield, James Wavell	Ventnor, Isle of Wight
1842		Lloyd, Edmund	Richmond
1841		Lloyd, Frederick Rugge	Highgate
1853		Lloyd, Thomas Henry	Woolwich
1856	436	Lloyd, Henry	Richmond

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1853		Lloyd, Henry	Deptford
1853		Lock, William	Boston
1846		Lockyer, George	Deptford
1853		Loggin, Charles Frederick	Stratford-on-Avon
1853		Longfield, Joseph	Leeds
1853		Longrigg, John	Appleby
1853		Lord, Ellis	Rochdale
1853		Lord, Charles	Todmorden
1841		Lofthouse, James	Hull
1853		Loveitt, George	Coventry
1841		Lovett, John	Gloucester
1841		Lowe, Thomas	Liverpool
1842		Lowndes, Hervey	Stockport
1853		Luff, William	Oxford
1853		Lumsden, James	Peterhead
1853		Lupton, Thomas	York
1842		Lynch, John R.	Manchester
1842		Mabson, William	Great Yarmouth
1853		Macdonald, John Thomas	Wisbeach
1853		McDiarmid, John B.	Deal
1842		Macfarlane, John F.	Edinburgh
1852	139	Macfarlane, Wardlaw	Edinburgh
1853		McGregor, Andrew	Glasgow
1853		McGuffie, John R.	Liverpool
1841		Mackay, John	Edinburgh
1852		Mackenzie, Duncan	Edinburgh
1852		Mackintosh, Archibald	Rothesay
1856	140	Mackintosh, James	Galashiels
1841		Maddock, William	Tunbridge Wells
1853		Madge, James	Devizes
1848		Maggs, Samuel Blount	St. Leonard's
1845		Maggs, Thomas C.	Yeovil
1845		Maleham, Henry	Sheffield
1844		Maling, William	Newcastle-on-Tyne
1842		Manfield, John W.	Salford
1853		Manifold, John J.	Weaverham
1853		Mansley, Allen	Leigh
1841		Manthorp, Samuel	Colchester
1850		March, William	Newark
1846		Marchant, Charles Frederick	Ipswich
1845		Marder, John	Lyme Regis
1846		Marks, George	Bradford
1857	205	Marks, Edward L.	Liverpool
1853		Marlor, Jabez	Lees, near Oldham
1852		Marsh, Joseph T.	Wirksworth
1842		Marsh, William M.	Sevenoaks
1842		Marshall, John F.	Gainsborough
1853	311	Marshall, Robert	Boston
1842		Marshall, James A.	Waltham Abbey
1842		Marston, Richard	Ludlow
1842		Martin, Edward W.	Guildford
1845		Martin, Thomas	Lewes
1841		Martin, John	Bristol
1841		Martin, Charles	Stroud

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1851		Martin, Henry G.	St. Albans
1853		Martin, Thomas	Liverpool
1853		Mason, Joseph W.	Cirencester
1842		Mason, William W.	Manchester
1853		Mason, William	Hastings
1853		Mather, William	Manchester
1853		Maunder, Alexander	Weston-super-Mare
1853		Mawson, John	Newcastle-on-Tyne
1842		May, Enoch	Tewkesbury
1842		May, Charles	Reading
1848		Maynard, Robert H.	Brandon
1842		Mays, Robert James John	South Shields
1843		Meadows, John	Leicester
1842		*Mease, Solomon	North Shields
1853		*Mease, Robert D.	North Shields
1842		Meatyard, Robert	Basingstoke
1853		Medd, Joseph	Gloucester
1842		Medcalf, Benjamin	Ware
1843		Medcalf, Ebenezer	Lower Tooting
1857	215	Medley, William	Derby
1845		Medwin, Aaron	Blackheath
1853		Melhuish, John	Taunton
1842		Melson, John	Hull
1853		Meredith, Edwin Richard	Bristol
1850		Merrick, Thomas J.	Northampton
1853		Merryweather, Charles	Leicester
1854	106	*Metcalfe, Christopher L.	Hull
1853		Michell, John A.	Falmouth
1853		Millais, Thomas	Jersey
1853		Miller, Jeptha	Saffron Walden
1842		Miller, Charles	Oxford
1853		Miller, William	Liverpool
1853		Miller, William Henry	Sheffield
1853		Miller, John Thomas	Sheffield
1843		Miller, Robert P.	Reading
1845		Mills, Robert M.	Bourne
1853		Mills, James Arthur	Dereham East
1853		Milton, William	Exeter
1847		Mitchell, John	Manchester
1853		Mitchell, Thomas	Sunderland
1842		Mole, William Tingey	St. Neots
1844		Moor, Joseph	Bury St. Edmunds
1856	40	Moore, Edward H.	Shoreham
1846		Moore, John	Blackpool
1842		Moore, Henry	Worcester
1841		Mordaunt, Alfred	Southampton
1842		Morgan, Benjamin	Llandilo
1853		Morgan, William	Newport, Monmouth
1844		Morris, Alfred Philip	Stourbridge
1853		Morris, Philip Henry	Newport, Monmouth
1848		Morse, Charles B.	Bishop Stortford
1844		*Morse, George	Mortlake
1853		*Morton, Jameson	Ramsbottom
1852		Morton, John	Durham

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1845		Morton, Henry	Ramsgate
1849		Moss, William	Carlisle
1853		Mount, William	Canterbury
1853		Mousley, William	Redditch
1841		Mullett, Charles	Ilminster
1847		Mumbray, Robert George	Manchester
1853		Mumby, Charles	Gosport
1853		Munday, Edward Smith	Worthing
1851		Mundy, William	Melksham
1853		Murdoch, William	Glasgow
1852		Murdoch, George	Glasgow
1849	63	Murdoch, James	Glasgow
1853		Murdoch, David	Falkirk
1841		Muriel, Harry Brooke	Brighton
1849		Muskett, Charles	Derby
1842		Muskett, James	Harleston
1844		Musson, Telemachus G.	Birmingham
1842		Napier, James	Edinburgh
1853		Narracott, Henry	Torquay
1848		Naftel, Thomas S.	Guernsey
1856	262	Needham, Slater	Leicester
1842		*Negus, Samuel	Northampton
1853		Neil, John	Glasgow
1853		Newby, William Henry	Perth
1853		Newbery, Henry	Biggleswade
1853		Newcome, John	Grantham
1854		Newman, Robert	Bewdley
1845		Newman, Thomas	Hartley Row
1853		Newman, Walter F.	Falmouth
1853		Newton, George	Newcastle
1847		Newton, Christopher	Edinburgh
1853		Niblett, John	Stroud
1852		Nicol, George	Pulteney Town
1841		Nichol, Anthony	Newcastle-on-Tyne
1853		Nichol, Thomas Dale	Newcastle-on-Tyne
1853		Nicholas, John	Narberth
1841		Nicholls, James	Stourbridge
1842		Nielson, Francis E.	Buxton
1850		Nightingale, Joseph S.	Hull
1843		Nightingale, Henry L.	Egham
1845		Nind, George	Wandsworth
1853		Nix, John K.	Billericay
1841		Noakes, Richard	Brighton
1846		Northcroft, Jonathan	Plymouth
1853		Norwood, Thomas	Hastings
1842		Oakey, Joseph Malpas	Preston
1853		Obbinson, Thomas	Sleaford
1853		Oldham, William T.	Wisbeach
1844		*Oliver, William	Bristol
1853		Oliver, John	Liverpool
1842		Orange, John	Portsea
1845		Otter, William	Bloxham
1842		Overbury, Henry	Alcester
1845		Owen, Griffith	Caernarvon

Year of Admission	No. of Certificate.	NAME.	RESIDENCE.
1842		Owen, William	Newcastle-on-Tyne
1845		Owles, James	Bungay
1842		Owles, John	Yarmouth
1842		Pain, George Alison	Cambridge
1842		Paine, William	Canterbury
1847		Palethorpe, Samuel	Nottingham
1841		Palk, Edward	Southampton
1841		*Palk, John	Exeter
1847		Palmer, Faithful	Cheltenham
1842		Palmer, Thomas J.	East Grinstead
1845		Palmer, Thomas William	Leicester
1842		Parker, Edward	Carlisle
1853		Parker, Frederick	Derby
1853		Parker, John	Birmingham
1853		Parker, Matthew	Bath
1853		Parker, William Henry	Leeds
1841		Parker, Thomas	Halifax
1842		Parkes, Joseph	Atherstone
1842		Parkes, Thomas	Woolwich
1853		Parkes, John C.	Woolwich
1854	312	*Parkes, John P.	Manchester
1842		Parkinson, Thomas	Liverpool
1847		Parkinson, Robert	Bradford
1841		*Parnell, John	Peterborough
1842		Parsons, Thomas	Leicester
1850		Parsons, John	Ottery St. Mary
1850		Parsons, William	Portsmouth
1353		Parton, Joseph	Nantwich
1353		Pasmore, George	Exeter
1853		Pate, Henry Thomas	Ely
1853		Paterson, William	Aberdeen
1853		Patterson, George	Stamford
1853		Pattinson, Richard John	Carlisle
1841		Paul, Horace	Halsted
1853		*Paulden, William	Altrincham
1841		Payne, Reuben Craven	Bridgewater
1853		Payne, William Frederick	Aylesbury
1854	314	Peake, Henry	Dover
1855	313	Peake, James	Walmer
1842		Pearce, Thomas	Gloucester
1852		Pearless, John	East Grinsted
1853		Pearman, Henry	Stourbridge
1842		Pearson, Charles James	Swansea
1851		Pearson, Edward	Liverpool
1842		Peart, David	Witham
1842		Peat, Walter	Fareham
1853		Peatson, Henry Robert	Salford
1853		Pegg, Herbert	Birmingham
1853		Penney, George	Preston
1852		Penney, William	Poole
1853		Penrice, Joseph	Workington
1851		Peppercorn, Benjamin	Lincoln
1855		Perfect, George	Portsea
1841		Perrins, William	Worcester

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1843		Perry, Solomon	Tavistock
1853		Pertwee, Edward	Romford
1853		Pertwee, Alfred R.	Chelmsford
1853		Phillips, John	Birmingham
1852		Phillips, Edward James	Newport, Monmouth
1853		Phillips, John	Newport, Monmouth
1845		Phillips, Thomas	Wincanton
1845		Philpott, John	Bromyard
1856	326	Phillips, William Thomas	Carmarthen
1842		Pickering, Henry	Leicester
1853		Pickering, Atkinson	Hull
1845		Pickup, Thomas Hartley	Blackburn
1841		Pickup, John	Manchester
1848		Pickup, Varey	Salford
1853		Pidgeon, Henry	Shrewsbury
1853		Pidgeon, John	Taunton
1841		Pierce, Edward Lloyd	Shelton
1853		Pilley, Samuel	Boston
1853		Pilley, John	Boston
1853		Piquet, John	Jersey
1853		Pissey, William	Rayleigh
1853		Pitts, Robert Christopher	Norwich
1853		Player, Edmund	Bristol
1842		Pocklington, James	Sydenham
1853		Pollard, William J.	Nailsea
1852		Ponting, Thomas Cadby	Bristol
1845		Pooley, John Carpenter	Bath
1854	15	Porter, William Henry	Rochester
1846		Portway, John	Bury St. Edmunds
1853		Potts, Thomas	Newcastle
1855		Poulton, John	Newton Abbott
1852		Powell, Frederick W.	Leith
1842		Powell, John	Shaftesbury
1842		Powell, Edward	Winchester
1852		Power, Edward	Walton-on-Thames
1842		Pownall, John	Salford
1841		Pratt, John	Chichester
1846		Pratt, John	Bradford
1853		Pratt, Richard Munton	Otley
1853		Priestlay, Henry	Pontefract
1841		Priestley, John	Liverpool
1852		Prince, Henry	Taunton
1855	290	*Pring, Walter	Taunton
1855		Prior, George T.	Oxford
1842		Prockter, Richard Edgcumbe	Cheltenham
1841		Procter, William	Liverpool
1848		Proctor, William	Newcastle
1853		Procter, Joseph	Barnard Castle
1841		Proctor, William	Newcastle
1857		Proctor, Barnard S.	Newcastle
1853		Prott, William	Huntly
1852	144	Prott, William, jun.	Huntly
1842		Prout, Robert	Milton Abbott
1852	327	Prowse, Charles	Bristol

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1853		Pryer, William Symes	Axminster
1852		Pullin, Edwin	Northampton
1841		Purdue, Thomas	Witney
1855	355	*Pyne, Joseph J.	Manchester
1853		Quine, James	Douglas, Isle of Man
1842		Race, William	Manchester
1851		Radford, Isaiah C.	Devonport
1841		Radley, William Valentine	Sheffield
1853		Rae, James	Stirling
1842		Raimes, Richard	Edinburgh
1853		Rait, Thomas C.	Partick
1853		Ralfs, Henry Charles	Brentford
1853		Ramsey, Henry P.	Ashford
1841		Ramskill, Parson	Leeds
1841		Randall, Edward Mayor	Southampton
1845		Randall, William Brodribb	Southampton
1853		Randall, Thomas	Wareham
1853		Randleson, William	Whitehaven
1853		Ranken, James Anderson	Forfar
1848		Rankin, William	Kilmarnock
1842		Ransford, Samuel	Cleveden
1853		Ransom, William	Hitchin
1853		Ransome, Thomas	Manchester
1851		Rastrick, George T.	Geelong
1853		Rastrick, William Henry	Portsea
1842		Rastrick, Joseph Linington	Southsea
1842		Rastrick, John Alfred	Woolwich
1841		Raw, John	Preston
1853		Rawdin, Joseph	Jedburgh
1841		Rawle, William	Liverpool
1854	206	Rayner, John	Nottingham
1852		Rayner, John	Uxbridge
1842		Reading, Robert Grant	Warwick
1841		Readman, William	Leighton Buzzard
1842		Redfern, John	Ashby-de-la-Zouch
1853		Redmayne, Christopher	Warrington
1853		Rees, William Henry	Dartmouth
1842		Reeve, William	Canterbury
1853		Reid, David	Aberdeen
1853		Reid, John	Montrose
1857	251	Reid, Neil	Perth
1845		Reinhardt, Johaan Christian	Hull
1841		Reinhardt, George	Leeds
1848		Rendall, John M.	Torquay
1842		Reynolds, William	Halesworth
1854	109	Reynolds, Richard	Leeds
1849		Rhodes, Frank	Wycombe
1853		Rhodes, James	Manchester
1853		Rich, Thomas	Weston-super-Mare
1853		*Richards, William	Falmouth
1853		Richardson, Allen	Manchester
1842		Richmond, Robert	Leighton Buzzard
1852		Righton, Job Castle	Tamworth
1842		Rimmington, Felix M.	Bradford

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1842		Ritson, John George	Sunderland
1842		Ritson, Thomas	Sunderland
1847		Roberton, James	Manchester
1853		Roberts, Thomas A.	Conway
1852		Roberts, Griffiths J.	Holyhead
1842		Roberts, Charles	Westbury
1841		Roberts, Albinus	St. Albans
1851		Roberts, Edwin	Liverpool
1842		Roberts, John Bellard	Bourne
1852		Robertson, James	Edinburgh
1853	331	*Robertson, Thomas Berkley	Cullen
1854		Robinson, Levi	Alford
1842		Robinson, James Mowld	Beverley
1855	249	Robinson, Ralph	Durham
1842		Robinson, Charles S.	Mansfield
1855	193	Robinson, Benjamin	Salford
1853		Robinson, James	Nottingham
1851		Robson, Thomas	Brighton
1842		Robson, George	Durham
1853		Rodgerson, William	Liverpool
1842		Roe, Thomas	Ollerton
1853		Roe, William Charles	Blackheath
1853	5	Rogers, John Robinson	Honiton
1853		Rogers, William	Maidstone
1842		Rogers, John	Ledbury
1842		Rogerson, Michael	Bradford
1853		Rome, Robert M.	Langholm
1853		Rook, Edward	Sittingbourne
1853		Rooker, Abel	Wolverhampton
1851		Roose, Robert	Ruthin
1845		Ross, Stephen	Lancaster
1853		Row, Charles	Devonport
1843		Rowe, John	Plymouth
1853		Rowlands, Thomas	Epping
1853		Rowlands, Williams S.	Devizes
1853		Ruffe, Frederick	Tamworth
1846		Russell Thomas	South Shields
1853		Russell, Charles J. L.	Windsor
1853		Rust, James	Swaffham
1853		Rutherford, Thomas H.	Seaham
1853		Sagar, Henry	Leeds
1841		Salisbury, John	Sheffield
1842		Sanders, William H.	Bristol
1847		Sandiland, Robert	Bicester
1853		Sangster, John	Aberdeen
1853		Satterley, William B.	Guernsey
1845		Saunders, David Price	Haverfordwest
1853		Saunders, George	Oswestry
1841		Savage, William Dawson	Brighton
1853		Sawer, William	Stroud
1841		Sawyer, Thomas	Ramsgate
1842		Sawyer, James	Carlisle
1853		Saxby, Henry	Lewes
1852		Scarrow, William	Sunderland

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1846	2	Schacht, Frederick George	Clifton
1856		Scholefield, George	Birkenhead
1853		Scott, Edward	Birmingham
1856	426	Searby, William M.	Norwich
1854	239	Seath, Alexander	Dunfermline
1847		Seaton, John Love	Hull
1841		Selfe, Isaac	Bristol
1852	60	Sessions, Joseph James	Goldalming
1843		Severs, Joseph	Kendal
1846		Sewell, James	Sheffield
1853		Sewell, John Holmes	Swindon
1841		Seyde, John F.	Willenhall
1841		Shackel, John Well	Maidenhead
1853		Shadford, Major	Spalding
1853		Sharland, Edmund T.	Bristol
1853		Sharp, Benjamin	Warrington
1847		Sharp, Henry	Christchurch
1842		Sharp, Joseph	Salford
1841		Sharples, William	Preston
1843		Sharples, George	Preston
1853		Shattock, John	Taunton
1843		Shaw, John	Liverpool
1842		Shaw, Charles Wright	Liverpool
1842		Shaw, Alexander Henry	Stockport
1854		Shenstone, James B.	Colchester
1841		Shepard, William	Market Harborough
1853		Shepherd, James	Aberdeen
1857	371	Shepherd, George Prentis	Guildford
1848		Shepperley, James	Nottingham
1852		Shield, George	Arbroath
1842		Shillcock, Joseph Bradley	Bromley, Kent
1841		Shum, Henry	Swansea
1853		Sidebottom, William	New Mills
1842		Silvester, Joseph	Knutsford
1853		Sim, James	Aberdeen
1847		Simmons, Frederick	Worcester
1842		Simonds, William	Boston
1843		Simpson, John	Hull
1842		Simpson, Thomas	Stowmarket
1853		Sinclair, William	Aberdeen
1853		Sincock, William	Andover
1852		Sircom, Richard	Bristol
1841		Sirett, George	Buckingham
1843		Slater, William Boocock	Blackburn
1853		Slayter, George	Reading
1852		Smale, William	Oswestry
1853		Smale, Richard Bill	Oswestry
1843		Smallwood, John Wright	Macclesfield
1853		Smart, Nevill	Littlehampton
1841		*Smeeton, Edward	Leeds
1853		Smethurst, Richard L.	Salford
1853	169	Smith, John	Aberdeen
1853		Smith, William	Brighton
1853		Smith, William	Bridlington

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1841		Smith, Nathaniel	Cheltenham
1841		Smith, Thomas	Colchester
1842		Smith, William	Sutton Coldfield
1842		*Smith, William	Abingdon
1842		Smith, James Russell	Woodbridge
1853		Smith, Henry	Eccleshall
1842		Smith, Henry	Edinburgh
1853		Smith, Josias	Hyde
1843	31	Smith, John	Portsmouth
1842		Smith, Alfred	Tenterden
1853		Smith, Benjamin	Cardiff
1842		Smith, William	North Shields
1842		Smith, William	Woolwich
1853		Smith, James	Haltwhistle
1853		Smith, Edward	Norwich
1849		Smith, William	St. Andrews
1856	416	*Smith, Thomas J.	Hull
1853		Smyth, Walter	Merthyr Tidvil
1842		Snelling, Francis	Horsham
1841		Southall, William	Birmingham
1841		Southall, Thomas	Birmingham
1850		Southall, William, jun.	Birmingham
1842		Sowerby, John	Carlisle
1853		Sowter, William Barter	Middleton
1852		Spence, Thomas B.	Dundee
1843		Spencer, Charles	Gravesend
1842		Spencer, William	Monmouth
1853		Spencer, William Henry	Burnham Market
1853		Spencer, Thomas	Wokingham
1853		Spencer, George	Lincoln
1842		Spettigue, Joseph	Launceston
1853		Spokes, Peter	Reading
1845		Spong, Thomas Willsden	Biggleswade
1853		Spurr, John	York
1842		Squire, William	Hanwell
1853		Squire, William	Nottingham
1853		Squire, William	Goole
1853		Stafford, William	Gloucester
1842		Standring, Thomas	Manchester
1842		Stantial, John	Corsham
1842		Stanton, Samuel	Thrapston
1847		Stead, William	Wakefield
1856	291	Steel, Henry	Shefford
1853		Steel, Samuel	Beccles
1841		Steele, Thomas	Bath
1855	148	Steele, David	Edinburgh
1853		Sterriker, John	Driffield
1853		Stephens, Thomas	Merthyr Tydvil
1849		Stevens, John	Birmingham
1852		Stevens, George	Strood
1846		Stevenson, Richard	Derby
1842		Steward, Charles S. Dale	Yarmouth
1847		Steward, William	Bridgnorth
1841		Steward, Josiah	Kidderminster

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1841		Steward, Theophilus	Kidderminster
1853		Steward, John	Brierley Hill
1854	278	Steward, Alfred	Yarmouth
1841		Stiell, Gavin	Dunfermline
1853		Stoddart, William Walter	Bristol
1853		Stone, John	Exeter
1852		Stonham, Thomas G.	Maidstone
1841		Stott, William	Sowerby Bridge
1853		Strange, William Bond	Downend
1847		Strawson, Henry	Crewkerne
1856	292	Stroud, John	Bristol
1853		Stuart, Henry James	Ingatestone
1842		Stuart, Charles	Woolwich
1853		Stuart, Henry W.	Woolwich
1853		Sturton, Joseph	Cambridge
1841		Sturton, John	Peterborough
1855	394	*Sturton, Richard	Peterborough
1853		Sugden, Samuel	Newchurch
1853		Suggate, Henry Ezra	Great Yarmouth
1852		Sumner, Robert	Liverpool
1855	170	Sumner, William	Birmingham
1852		Sumner, John	Birmingham
1853		Sutcliffe, William	Stalybridge
1853		Sutcliffe, James	Bradford
1853		Sutherland, John	Aberdeen
1853		Sutterby, Jonathan N.	Sutton Bridge
1853		Sutton, Francis	Norwich
1843		Symonds, John	Aylsham
1853		Symons, William	Dunster
1854		Symons, John Netherton	Penzance
1847		Sympson, Charles	Lincoln
1852	149	Tait, William	Edinburgh
1841		Tanner, Nicholas William	Exeter
1853		Taplin, Joseph	Bristol
1847		Tarzewell, Richard	Braintree
1841		Tatham, John Walkingame	Barnstaple
1852		Tatham, Leonard F.	Bradninch
1845		Tayler, William Henry	Warminster
1841		Taylor, John	Preston
1852		Taylor, John Hawarden	Preston
1853		Taylor, Thomas John	Preston
1842		Taylor, James	Manchester
1853		Taylor, Henry	Manchester
1842		Taylor, Thomas H.	Manchester
1852		Taylor, John	Wakefield
1850		Taylor, Sydney	Pendleton
1842		Taylor, Edward	Rochdale
1853		Taylor, John	Rawtenstall
1854	362	Taylor, Richard	Ryde
1848		Taylor, John Usher	St. Ives
1842		Taylor, Thomas	Stalybridge
1842		Taylor, Stephen	Westbury
1848		Teasdale, Thomas	Darlington
1842		Teear, John Manshaw	Leicester

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1842		Telfer, Frederick	Oxford
1853		Templeton, John	Glasgow
1842		Thomas, John Holliday	Boston
1852		Thomas, Robert	East Looe
1846		Thomas, Richard	Burnley
1853		Thomas, Morgan	Cardiff
1853		Thomas, John	Cowbridge
1853		Thomas, James	Bridge, Kent
1853		Thomas, Robert	Dover
1853		Thomas, James	Hythe
1853		Thompson, George	Alston
1841		Thompson, John	Thirsk
1846		Thompson, Edward	Otley
1853		Thompson, Henry	Norwich
1849		Thompson, John	Liverpool
1842		Thompson, Henry	Middlesborough
1850		Thompson, Thomas	Richmond, Yorkshire
1853		Thompson, Robert F.	Sunderland
1853		Thompson, William	Sunderland
1846		Thompson, Andrew	Carlisle
1853		Thonger, Gilbert	Birmingham
1853		Thorne, John	Bedford
1853		Thornton, John	Wedmore
1853		Thornton, Edward	Lyme Regis
1842		Thornton, Samuel	Exmouth
1857	417	Thornton, John Barber	Dover
1853		Thurland, Edward	Oxford
1853		Tiernan, Robert	Liverpool
1853		Timothy, Thomas Norris	Reading
1841		Tinker, Edward	Liverpool
1841		Titherington, Thomas A.	Liverpool
1843		Tomlinson, Charles Knowles	Lincoln
1853		Toone, Joseph Vidler	Warminster
1847		Tonge, James Scawin	York
1853		Townsend, John H.	Bristol
1842		Tozer, Richard John	Exeter
1841		Tribe, John	Chatham
1841		*Trix, John	Exeter
1852	150	Trotter, George	East Linton
1853		Troughton, James	Liverpool
1841		Trueman, William	Durham
1853		Truman, Francis C.	Jersey
1841		Tryon, William George	Portsea
1843		Tucker, Charles	Bridport
1853		Tucker, James	Gloucester
1853		Tuff, John	Enfield
1842		Tunley, John	West Bromwich
1853		Turner, Robert	Oundle
1845		Turner, Thomas	Newcastle-under-Lyne
1848		Turner, John A.	Liverpool
1856	264	Turner, Walter	Mold
1851		Turner, Frederick E.	Holywell
1854	265	Turner, William Henry	Birkenhead
1853	162	Turney, Samuel B.	Cambridge

Year of Admission	No. of Certificate.	NAME.	RESIDENCE.
1853		Turton, Luke	Bradford
1853		Turton, Thomas J.	Howden
1841		Tylee, John P.	Bath
1853		Urquhart, John	Aberdeen
1852		Urwin, John	Bedlington
1853		Veitch, James	Dunse
1853		Veitch, William	Shildon
1845		Vincent, Philip	Fulham
1841		*Visick, Robert Goodyear	Exeter
1853		Vose, Thomas	Liverpool
1842		Wain, William	Ripley
1842		Wainwright, James	Howden
1842		Waite, Joseph	Cheltenham
1847		Walker, Edward	Newcastle-on-Tyne
1841		Walker, George Clarke	Doncaster
1842		Walker, Edward Hawxby	Doncaster
1853		Walker, John Dutton	Liverpool
1842		Walker, William	Malmsbury
1853		Walker, John	Bradford
1846		Walker, William H.	Southport
1853		Walker, John C.	Birmingham
1853		Walker, Thomas D.	Liverpool
1847		Walker, James	Melrose
1842		Walkinton, William	Tenby
1848		Wall, William James	Tottenham
1857	75	Wallworth, David	Maldon
1854	343	Walsh, Edward	Manchester
1852		Walsh, William	Oxford
1853		Walter, Joseph	Horncastle
1848		Walton, John	Sunderland
1842		Warburton, Thomas	Bolton
1841		Ward, James	Falkingham
1845		Ward, James	Richmond, Yorkshire
1853		Ward, Francis	Battle
1851		Ward, William	Sheffield
1853		Wardle, William Henry	Stalybridge
1842		Warren, James	Portsea
1842		Warrior, William	Northallerton
1853		Wastnage, Thomas W.	Surbiton
1853		Waterall, George	Nottingham
1853		Waterall, George Edwards	Nottingham
1853		Waterfall, William	Newcastle
1847		Waterson, John	Birmingham
1842		Watkins, George H.	Walsall
1853		Watkinson, Thomas	Bilson
1841		Watlock, John Dawson	Wandsworth
1853		Watlock, Benjamin D.	Battle
1846		Watson, Henry	Cambridge
1847		Watson, Edward M.	Worle
1853		Watt, James	Haddington
1853		Wavell, John	Ryde
1853		Wearing, William	Lancaster
1853		Wearing, William Henry	Liskeard
1848		Wearing, Richard	Liverpool

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1842		Weaver, Frederick	Wolverhampton.
1853		Webb, Thomas S.	Bilston
1853		Webber, George William	Torquay
1853		Webster, Edwin P.	Newcastle-on-Tyne
1852		Webster, Samuel M.	Warrington
1845		Weeks, Caleb	Torquay
1853		Welch, Charles	Nottingham
1844		Weller, George	Windsor
1850		Weilington, Frederick G. N.	South Petherton
1842		Wellington, James Martin	Oakham
1853		Wellman, William	Jersey
1852		Welsh, Alexander	Dalkeith
1853		West, Henry James	Coventry
1850		West, Isaac	Oxford
1856		West, William	Henfield
1846		Westall, Richard	Ramsgate
1853		Westmacott, George	Manchester
1854	180	Wharrie, Decimus	Liverpool
1854	156	Wheeler, Francis	Norwich
1847		*Wheeler, John	Chipping Sodbury
1846		Wheeler, James Edward	Ryde
1842		Whimpray, John	Lancaster
1853		Whitaker, John	York
1853		Whitall, James	Chertsey
1853		White, Frank	Nottingham
1842		White, Robert Rowles	Dursley
1842		White, James Aitken	Manchester
1850		White, Luke P	Peniston
1842		White, Thomas	Bilston
1846		White, George	Havant
1846		Whitehead, Edwin	Fleetwood
1853		Whitehead, John	Rochdale
1842		Whitfield, John Lockley	Worcester
1847	16	Whitfield, John	Worcester
1846		Whitlock, Edwin	Salisbury
1853		Whittaker, William	Runcorn
1852		Whittaker, Ellis	Salford
1853		Whittle, Samuel	Leigh
1841		Whitton, George	Horncastle
1852		Whitwell, John	Thirsk
1845		Wibmer, Lewis Michael	Tunbridge
1853		Wice, Jonathan Haigh	Wakefield
1842		Wigg, John Goddard	Lynn
1845		Wiggin, John	Ipswich
1853		Wild, Joseph	Hyde
1847		Wilde, Eli	Manchester
1853		Wilding, William	Liverpool
1852		Wilkes, Seth Martin	Tewkesbury
1850		Wilkes, D. Tyers	Upton-on-Severn
1842		Wilkes, William	Bromyard
1850	73	Wilkinson, William	Manchester
1854	329	Williams, Terrick S.	Liverpool
1854		Williams, Joel D.	Bodmin
1853		Williams, William	Haverfordwest

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1853		Williams, Philip	Horsham
1844		Williams, Walter	Hereford
1853		Williams, Robert	Liverpool
1842		Williams, William	Nottingham
1842		Williams, David	Pwllheli
1853		Williams, John	Leamington
1853		Williams, Edwin	Manchester
1853		Williamson, James	Edinburgh
1853		Williamson, Peter	Aberdeen
1844		Williamson, James	Hunslet
1853		Willmott, Charles	Brighton
1855	171	Wills, Thomas D	Barnstaple
1853		Wilshaw, James	Wordsley
1844		Wilson, Joseph	Canterbury
1841		Wilson, Charles Thomas	Swansea
1842		Wilson, Thomas	Bradford
1853		Wilson, John	Harrogate
1854		Wilson, William	York
1853		Wilson, Edward	Sheffield
1855	303	Wilson, Joseph	Penrith
1842		Windeatt, John	Dartmouth
1841		Wine, John	Bristol
1842		Wing, Thomas N.	Melton Mowbray
1853		Wing, Alfred	Leamington
1856	254	Wingate, Stephen	Gloucester
1853		Withers, John	Reading
1847		Withers, Richard	Blackwater
1842		Witherington, Thomas	Worcester
1853		Withey, William Henry	Stroud
1853		Wood, Anthony	Arnold
1852	111	Wood, Edward	Brighton
1853		Wood, Benjamin	Halifax
1853		Wood, John Edward	Harlow
1842		Wood, William Webb	Pontypool
1842		Wood, Edwin	Abersychan
1846		Wood, Henry	Brentford
1853		Woodcock, Page D	Lincoln
1842		Woods, William	Worcester
1853		Woodward, Charles	Ryde
1853		Woodward, William	Langport
1853		Woodward, William	Nottingham
1844		Woolley, Daniel	Stockport
1841		Woolley, James	Manchester
1842		Wooldridge, Thomas	Windsor
1854		Woolrich, Thomas	Stone
1850		Wootton, William	Wolverhampton
1856	255	Wortley, John	Durham
1842		Wreaks, Thomas Peacock	Glossop
1842		Wreaks, George D	Sheffield
1846		Wright, George Warren	Macclesfield
1842		Wright, Charles	Manchester
1844		Wright, John James	Sheffield
1853		Wright, Thomas Williams	Buckley
1853		Wright, James	Chesterfield

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1853		Wright, Joseph	Ardwick
1853		Wright, William	Liverpool
1853		Wyatt, Samuel	Tottenham
1845		Wylde, John	Manchester
1841		Wyley, John	Coventry
1853		Yates, George	Liverpool
1852	153	Young, James R.	Edinburgh
1844		Young, John	Sunderland
1853		Young, Tonkin	St. Ives
1853	224	Youngman, Edward	Bury St. Edmunds
1855	345	*Youngman, Robert	Cambridge

ASSOCIATES

ADMITTED BEFORE THE 1st OF JULY, 1842.

NAME.	RESIDENCE.
Baigent, William H.	London
Baker, Garrard	Chelmsford
Bannick, Henry Stokes	London
Barber, William Jas.	London
Baylis, Thomas	Worcester
Beaton, John William	London
Bell, William	Carlisle
Blyth, George Lindsey	Brighton
Bowman, William	London
Brewster, Godfrey W.	Cambridge
Buss, Thomas	London
Brown, Henry F.	London
Chadwick, Henry	London
Charity, William	Alford
Coates, John M.	Coventry
Cooper, William H.	Chelsea
Cowl, William	Durham
Crispe, James	London
Crocker, Edwin	Plymouth
Croucher, William	Shadwell
Dallas, John	London
Dew, Joseph Jennings	London
Dobson, John	Newcastle
Dunn, Edward	London
Ellwood, William	Carlisle
Gedge, William S.	London
Grainger, E. J.	Brighton
Hamilton, John T.	Dublin
Handsley, Taylor	London
Hindsley, Henry	London
Hingston, Andrew H.	Cheltenham
Holt, Isaac	Manchester
Howden, Robert	Islington
Jenner, W. M.	Sandgate
Kitching, John	Newark
Knight, John	Cambridge
Lee, James	London
Limon, Henry	Horncastle
Mackay, John	Worcester
Mackey, John B.	London
Middleton, Francis	London
Morgan, William B.	London
Mornement, Henry J.	London
Peat, William H.	Ryde
Radford, William	Devonport
Risbrock, Henry	London
Roberts, William	Bolton
Rolph, George	Gravesend
Sawyer, Henry	Ramsgate
Selleck, Edward	London
Soulby, Henry	Beaconsfield
Steele, John W.	London
Stewardson, Henry	Bedford
Strange, James Jeffery	London
Sylvester, Paul	Birmingham
Taylor, George	London
Thompson, Morley	London
Tilburn, Robert J.	Sheffield
Townsend, Charles	London
Turner, George	Honiton
Walker, William	Malmsbury
Warren, William A.	Malmsbury
Webb, John W.	Gloucester
Were, Ellis	London
Wilkes, David	Breedon
Williams, Walter C.	Brentwood
Wright, George H.	London

ASSOCIATES OF THE SOCIETY

WHO HAVE PASSED THE MAJOR EXAMINATION.

Year of Admission	No. of Certificate.	NAME.	RESIDENCE.
1850	76	Alexander, William	Peckham
1850	400	Amos, Daniel	Canterbury
1853	268	Argles, John	Maidstone
1855	457	Atherton, John H.	Liverpool
1851	419	Atkins, Ernest R.	Woolwich
1853	431	Bailey, Richard	Salisbury
1853	242	Baines, William H.	Halifax
1846	424	Barker, Matthew Mark	York
1854	374	Barnsby, Robert David	Tours
1853	256	Barry, Thomas	Aberavon
1847	243	Bates, James	Burslem
1855	402	Beach, James	Bridport
1853	280	Bell, Francis	Wakefield
1853	346	Bennett, Robert	Lincoln
1853	322	Bishop, Alfred	Ludlow
1852	208	Blackburn, Francis	Ramsgate
1856	449	Bloye, Henry	Holt
1851	332	Borland, John	Kilmarnock
1853	209	Boyce, George	Chertsey
1850	272	Breton, Walter	Margate
1855	428	Brevitt, William Yates	Birmingham
1849	385	Brown, Allan M'Laren	Brighton
1853	333	Butt, Edward Northway	Newbury
1853	444	Calvert, John	Durham
1854	380	Christopher, James	Crickhowell
1853	200	Clarke, William R.	Leighton
1854	386	Clayton, George Audley	Shrewsbury
1853	281	Cleave, Charles T.	Chudleigh
1846	91	Copney, William	London
1854	466	Cornelius, James	Clapham
1848	367	Cotton, John L.	Barnstaple
1853	395	Cracknell, Benjamin	Halesworth
1855	432	Cross, William	Bristol
1851	351	Daines, Thomas	London
1848	377	Davies, William G.	Shrewsbury
1853	282	Davis, Richard H.	Kendal
1853	229	Duncanson, William	Glasgow
1851	352	Dyson, William B.	Wakefield
1853	324	Edman, Bonner	Lincoln
1853	368	Evans, William H.	Haverfordwest
1853	411	Evans, Evan	Carmarthen
1852	462	Eyre, Joshua J.	Manchester
1856	464	Featherston, John P.	London

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1853	336	Fisher, William F.	London
1851	445	Ford, Charles	Reading
1852	160	Forrest, Richard	London
1855	421	Fouracre, Robert	Salisbury
1853	283	Freeman, William	Devizes
1850	92	Fyfe, John L.	Brighton
1850	403	Gibbons, George	Clifton
1856	446	Green, John	Oundle
1856	438	Groves, Henry	Weymouth
1856	434	Halliday, William Jabez	Pontefract
1856	447	Hayes, James	Tunbridge Wells
1849	404	Hopwood, Thomas S.	Richmond
1856	448	Houghton, William	Warrington
1851	405	Jessop, John	Clapham
1850	390	Johnson, George	Birmingham
1848	382	Jones, Hugh Lloyd	Chester
1853	340	Jones, William Withers	Welchpool
1852	418	Kemp, David Skinner	Edinburgh
1853	325	Kendall, Charles F.	Scarborough
1853	307	Kiddle, William L.	Bath
1853	234	Kinnimont, Alexander	Glasgow
1848	299	Kirkman, George B.	Clapham
1851	100	Langman, Peter	Chatteris
1849	429	Laurence, Henry	Richmond
1853	287	Lawrence, William P.	Macclesfield
1844	183	Lea, Charles Wheeley	Cheltenham
1856	300	Lenford, John	Canterbury
1852	236	Logan, Richard	Edinburgh
1854	388	Lomas, Joseph W.	London
1853	330	M'Intyre, Peter S.	Warkworth
1857	451	Marks, Nelson S.	Swansea
1853	247	Matterson, Edward H.	York
1842	392	Mercer, Nathan	Liverpool
1853	216	Morgan, William	Richmond
1853	354	Parrott, John S.	Birmingham
1856	453	Paterson, Douglas John	Nottingham
1852	430	Payne, John	Leighton
1847	425	Peel, James	Canterbury
1853	413	Penton, Charles W.	Maidstone
1853	301	Picnot, Charles	Rochester
1853	341	Pidduck, John W.	Bath
1850	414	Player, Jacob H.	Bedford
1853	422	Preston, Richard	London
1854	384	Prosser, Evan T.	Cardiff
1848	397	Radermacher, Charles J.	Glastonbury
1853	408	Rayner, William	Canterbury
1850	108	Reeve, Edward	London
1856	439	Reynolds, Arthur	Watton
1855	440	Richards, Charles	Weymouth
1855	459	Richardson, John G. F.	Longton
1849	393	Robbins, John	Launceston
1848	250	Rolfe, William A.	Wokingham
1855	461	Rowell, Charles Frederick	Uppingham
1850	415	Rowson, Henry	Chester

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1853	219	Salisbury, William B.	Sheffield
1853	463	Sarsfield, William	Durham
1856	452	Scholefield, Arthur	Basingstoke
1853	316	Scott, Thomas	Birmingham
1853	277	Sirett, George B.	Buckingham
1852	207	Skrimshire, Thomas	London
1848	451	Smeeton, George H	Birmingham
1849	454	Smeeton, William	Ironbridge
1853	356	Smith, Joseph	Birmingham
1853	349	Smith, Richard	Reigate
1842	46	Starkie, Richard S.	London
1852	147	Stathers, John	Edinburgh
1847	33	Swann, William H.	London
1855	409	Taplin, Frederick	Bristol
1853	221	Taylor, John N	Lincoln
1853	315	Thompson, William A.	Carlisle
1853	320	Thompson, Henry	Leatherhead
1849	372	Tibbs, Frederick	Sittingbourne
1853	342	Tuck, Francis	Trowbridge
1853	222	Turner, Charles E.	Leominster
1856	427	Tyler, Henry Wing	Leicester
1848	437	Tyrrell, John W.	Norwich
1853	266	Walmsley, Samuel	Wem
1853	253	Ward, Philip D.	Halifax
1853	398	Watson, Walker	Nuneaton
1853	456	West, Robert G.	Liverpool
1856	455	Weston, Charles	Lincoln
1851	114	Whitfield, Henry	Worcester
1853	423	Willett, Edmund	Brixton
1855	442	Williams, David Martin	Truro
1853	399	Williams, John Thomson	Carmarthen
1853	293	Williamson, David	Brighton
1854	359	Willmott, William	Bristol
1852	152	Wilson, James	Edinburgh
1848	172	Witt, Henry Matthew	Chelsea
1853	360	Woodcock, Joseph	Leicester
1849	294	Yarde, Giles	London
1846	223	Yates, William	Bridgnorth
1855	443	Yates, Francis	London

ASSOCIATES OF THE SOCIETY

WHO HAVE PASSED THE MINOR EXAMINATION.

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1853	441	Allingham, George Samuel	London
1852	161	Applegate, Edwin	Bradford
1856	434	Arnold, Spencer	Maidstone
1850	352	Attfield, John	Walworth
1853	417	Bamber, Henry K.	Exeter
1856	440	Banner, Samuel	Liverpool
1850	393	Baxter, George	Chester
1856	437	Bell, William M.	Stonehouse
1856	433	Bolton, Horatio Nelson	Boston
1855	434	Bond, Charles Ratcliffe	Ware
1853	407	Booth, Henry	Rochdale
1852	435	Britten, Thomas John	Leominster
1852	178	Buchanan, James	Edinburgh
1852	179	Cameron, William	Edinburgh
1853	340	Chapple, Edwin	Bideford
1854	344	Clingan, William J.	Edinburgh
1857	474	Cocking, Samuel	Howden
1856	456	Cortis, Edward Charles	Worthing
1842	42	Copeland, John	Woolwich
1855	372	Cornell, William	Ipswich
1850	196	Cutting, James	Stowmarket
1853	457	Cutting, Thomas John	Selby
1851	438	Dulley, Joseph	Northampton
1856	418	Farr, Archer	Lambeth
1856	446	Gill, Hugh	Selby
1855	405	Goddard, George	Lowestoft
1854	385	Griffiths, Alfred W.	London
1853	341	Grundy, Thomas	London
1855	404	Harden, Charles	Bristol
1852	335	Humphreys, Richard	London
1847	56	Huskisson, William J.	London
1852	184	Jamie, Robert	Edinburgh
1853	398	Johnson, Joseph	London
1855	380	Jolley, Horace	London
1847	381	Jones, Thomas	Chester
1853	338	Keeling, Thomas G.	Howden
1854	345	Leighton, Thomas	Edinburgh
1853	264	Lewis, Charles W.	London
1855	399	Lloyd, David L.	Caernarvon
1848	357	Long, Henry	Moorgate Street
1852	332	Long, Henry	Wigmore Street
1846	359	Longstaff, Thomas	Sunderland
1847	148	Matthews, William	London
1849	91	Miller, Thomas L.	Blandford

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1849	223	Mills, William P.	Macclesfield
1853	309	Moorhouse, Stephen	Stoke-on-Trent
1848	221	Murray, William S.	Berwick
1855	391	Nooten, Ernest Van	Edinburgh
1857	480	Oliver, John Hamer	Salop
1853	292	Ostler, Charles	Galashiels
1852	436	Paine, Standon	Brighton
1853	367	Parsons, Francis H.	Southam
1853	467	Pepper, Adolphus	London
1853	228	Pettifer, Edmund H.	Towcester
1853	294	Rhind, William W.	Berwick
1856	430	Roberts, Owen	Pwllheli
1855	388	Routledge, Henry	London
1852	395	Scott, Henry Thomas	Blandford
1853	453	Serpell, Samuel	Truro
1853	297	Simpson, Robert	Edinburgh
1853	321	Simpson, Thomas	Walsall
1853	268	Speechley, George	Peterborough
1852	413	Stedman, James	Lower Tooting
1853	402	Steevens, Joseph G.	Guildford
1851	364	Stewart, Charles J.	London
1856	423	Stewart, James	Kirkaldy
1853	281	Stoneham, Philip	London
1853	396	Symes, Henry T.	London
1855	383	Taplin, George	Bath
1850	326	Tasker, William	London
1856	439	Tipley, Frederick	York
1854	346	Thomson, John	Edinburgh
1853	333	Todd, Thomas	Edinburgh
1851	144	Towl, Edward	London
1849	283	Varness, Frederick	London
1849	125	Warner, John	London
1853	298	Watson, James	Montrose
1851	415	Watton, Edward	Manchester
1856	432	Williams, Thomas	Carmarthen
1856	421	Williams, Henry Levi	Newport

REGISTERED APPRENTICES.

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1857	Alderson, Frederick H.	Mr. Hempsted	St. Leonards
1857	Allan, William	Mr. Carruthers	Dumfries
1853	Ambrose, John D. L.	Mr. Farmer	Putney
1855	Andrews, Enos	Mr. Cropper	Long Sutton
1851	Anthony, John L.	Mr. Anthony	Bedford
1857	Appleton, Robert	Mr. Wilson	Sheffield
1853	Aston, George G.	Mr. Grindley	Chester
1845	Aston, Thomas	Mr. Fowke	Stafford
1853	Atkinson, George J.	Mr. Wilson	Harrogate
1856	Atkinson, Edward F.	Mr. Kerton	Hull
1848	Atton, John T.	Mr. Millns	Spalding
1852	Averill, John	Mr. Fowke	Stafford
1857	Bagshaw, James	Mr. Handley	Wakefield
1851	Balkwill, Alfred P.	Mr. Balkwill	Plymouth
1853	Banks, Morris	Mr. Banks	Birmingham
1854	Barber, William	Mr. Nunn	Bury St. Edmunds
1853	Barber, Tom	Mr. King	Rochester
1854	Barnes, Edwin	Mr. Morton	Durham
1846	Barrs, John Adcock	Mr. Briggs	Grantham
1851	Bartlett, Ebenezer	Mr. Mather	Reading
1856	Barton, Frederick	Mr. Wilson	Bradford
1855	Batchelor, George H. W.	Mr. Watts	Chatham
1856	Bate, Henry	Mr. Davies	Chester
1853	Beach, Thomas C.	Mr. Beach	Bridport
1854	Beach, Wesley	Mr. Beach	Bridport
1855	Beach, Thomas	Messrs. Lea & Co.	Great Malvern
1847	Beadell, Alfred	Mr. Gilpin	Newcastle
1855	Beaton, Walter	Mr. Beaton	London
1853	Beddard, John	Mr. Cross	Shrewsbury
1853	Bell, John	Mr. Sowerby	Carlisle
1857	Bell, James Alfred	Mr. Noakes	Brighton
1857	Bell, William	Mr. Cuthbert	Bedford
1855	Bennington, William	Mr. Mortimer	Sidmouth
1855	Bentley, William J.	Mr. Pryer	Axminster
1855	Berger, Volcy	Mr. Deane	Clapham
1854	Bingley, Frederick B.	Mr. Tanner	Exeter
1855	Birch, Henry C.	Mr. Clarke	Richmond
1854	Bird, David L.	Mr. Wilson	Canterbury
1854	Bishop, William	Mr. Gay	Stroud
1845	Blaxall, Arthur S.	Mr. Blanchflower	Loddon
1853	Blenkin, Peter S.	Mr. Lofthouse	Hull
1850	Blyth, William J.	Mr. Hurworth	York
1856	Bourdas, Isaiah	Mr. Bourdas	London
1856	Bowler, Harvey F.	Mr. Hitchcock	Colchester
1853	Bradfield, John	Mr. Quincey	Lynn
1854	Bradley, Edwin S.	Mr. Parker	Derby
1853	Brangan, Henry	Mr. Hewett	London
1856	Brayshay, Thomas	Mr. Brayshay	Stockton
1857	Brereton, Matthew B.	Mr. Mabson	Yarmouth
1856	Brew, John	Mr. Brew	Brighton
1854	Brice, William W.	Mr. Rook	Sittingbourne

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1853	Briggs, James A.	Mr. Briggs	Tipton
1856	Brock, George Walter	Mr. Fairbank	Woolwich
1856	Brooks, Saml. Brewer	Mr. Lawton	Wakefield
1853	Brown, Charles	Mr. Thorne	Bedford
1855	Brown, John	Mr. Waller	London
1855	Brown, William H.	Mr. Corder	North Shields
1856	Brown, John	Mr. Forge	Driffield
1856	Brown, Edward	Mr. Dutton	Birkenhead
1857	Browne, John Edwin	Mr. Bartlett	Chelsea
1853	Burdock, James	Mr. Reading	Warwick
1854	Burton, Joseph	Mr. Wick	Sheffield
1856	Burton, James	Mr. Allanson	Harrogate
1856	Burton, John	Mr. Parker	Derby
1857	Campbell, Robert	Mr. Mackay	Galashiels
1857	Carre, Louis C. A.	Mr. Tylee	Bath
1855	Carrington, Ebenezer T.	Mr. Toone	Warminster
1855	Cartner, David	Mr. Bell	Carlisle
1854	Chambers, William	Mr. Dresser	York
1855	Chapman, Francis C.	Mr. Green	Droitwich
1853	Chater, Edward M.	Mr. Chater	Watford
1853	Christian, John O.	Mr. Breary	Douglas
1851	Clarke, William	Mr. Parker	Birmingham
1852	Clarke, Arthur	Mr. Baker	Chelmsford
1855	Clarke, Willoughby	Mr. Brown	Oxford
1856	Clarke, Caudell	Mr. Searby	Norwich
1853	Cocking, Thomas	Mr. Wood	Holbeach
1853	Colquhoun, William	Mr. Harold	Battle
1857	Cole, Alfred	Mr. Groves	Hammersmith
1853	Cook, William	Mr. Gamble	Grantham
1855	Cooper, Frederick	Mr. Cooper	Leicester
1853	Cornish, Thomas R.	Mr. Cornish	Penzance
1856	Cornish, William	Mr. Cornish	Brighton
1854	Coulson, Henry	Mr. Coulson	Scarborough
1855	Coulthard, Christopher	Mr. Harrison	Carlisle
1853	Coward, Edward	Mr. Morton	Durham
1854	Cozens, William	Mr. May	Reading
1854	Crease, James	Mr. Mackay	Edinburgh
1852	Crossby, Joseph P.	Mr. Greaves	Bakewell
1853	Crussell, James W.	Mr. Cooper	London
1852	Dakin, John	Mr. Davies	Chester
1856	Dallas, Clement	Mr. Gay	Woodbridge
1854	Dalrymple, William	Mr. Luff	Oxford
1857	Davies, Robert John		London
1855	Davis, Richard	Mr. Smith	Walworth
1856	Davison, William	Mr. Greaves	Bakewell
1855	Dawson, John	Mr. Goddard	Yarmouth
1855	Dean, Samuel	Mr. Fox	London
1852	Deighton, Thomas M.	Messrs. Lea & Co.	Worcester
1852	Dempsey, William	Mr. Ramsay	Penrith
1853	Dickins, Benjamin	Mr. Kendall	Stratford
1853	Dowse, Thomas	Mr. Marks	Bradford
1853	Dowsett, Arthur	Mr. Baker	Chelmsford
1856	Draper, Henry Foulger	Mr. Arnold	Norwich
1852	Drury, John T.	Mr. Harvey	Newark

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1853	Dunn, James	Mr. Burdon	Durham
1857	Dunhill, William W.	Mr. Dunhill	Doncaster
1853	Earland, William	Mr. Davies	Hay
1856	Eason, John	Mr. Gilkes	Leominster
1853	Eddowes, Ralph	Mr. Fowke	Stafford
1857	Edwards, Frederick H.	Mr. Medcalf	Tooting
1854	Eland, Edward F.	Mr. Telfer	Oxford
1853	Elliott, Robert	Mr. Steward	Yarmouth
1849	Else, William	Mr. Jones	Derby
1856	Eminson, John	Mr. Marshall	Gainsborough
1856	Ereaut, John	Mr. Ereaut	Jersey
1846	Essery, William	Mr. Hallett	Plymouth
1853	Evans, William	Mr. Ferris	Bristol
1853	Evans, Edward	Mr. Bancroft	Ruthin
1854	Fairley, Robert	Mr. Mackay	Edinburgh
1852	Fallowfield, Jonathan	Mr. Sowerby	Carlisle
1856	Farrar, William	Mr. Heming	Sunderland
1853	Fenhoulet, James H.	Mr. Hewett	Yarmouth
1854	Fidel, Albert J.	Mr. Telfer	Oxford
1853	Fielder, Henry Thomas.	Mr. Fielder	Warminster
1856	Fletcher, John	Mr. Henson	Camberwell
1855	Fleetwood, Thomas	Mr. Kendall	Stratford
1845	Flood, William W.	Mr. Goodman	Exeter
1857	Foggitt, Thomas	Mr. Smeeton	Leeds
1852	Foster, Michael E.	Mr. Sturton	Peterborough
1854	Foster, Thomas U.	Mr. Weston	Sleaford
1851	Fowler, Robert J.	Mr. Harvey	Leeds
1856	Fox, Edward M.	Mr. Michell	Falmouth
1853	Fresson, William	Mr. Fresson	Stevenage
1852	Frost, George	Mr. Parker	Derby
1846	George, Henry	Mr. Davis	Leominster
1853	Gething, William	Mr. Tomlinson	Lincoln
1857	Gibbs, Thomas	Mr. Stewart	Yarmouth
1853	Gill, Levi J.	Mr. Tucker	Bridport
1851	Gilliatt, William	Mr. Gamble	Grantham
1857	Goldfinch, George	Mr. Goldfinch	London
1856	Goodchild, Nathaniel	Mr. Wood	Brighton
1855	Goodwyn, Charles S.	Mr. Chapman	Ipswich
1853	Graham, Ralph	Mr. Fairweather	Newcastle
1851	Green, Robert	Mr. Knott	Exeter
1855	Green, Conrad	Mr. Kendall	Stratford
1856	Green, James	Mr. Green	Bath
1855	Gregory, Richard	Mr. Lavers	London
1855	Grigor, William	Mr. Macfarlane	Edinburgh
1853	Gunn, Frederick T.	Mr. Cross	Shrewsbury
1856	Hall, Thomas H.	Mr. Hall	Southampton
1852	Halloway, John	Mr. Thompson	Carlisle
1856	Halsey, Bennet	Mr. Husband	Exeter
1854	Ham, Charles	Mr. Foster	Collumpton
1854	Harley, Edward	Mr. Foster	Ludlow
1850	Harpley, Richard B.	Mr. Hodgson	Stockton
1854	Harrison, Alfred C.	Mr. Edwards	London
1856	Harrison, Stephen	Mr. Breary	Douglas
1856	Hatch, Richard	Mr. James	Bognor
1853	Haslam, Frederick B.	Mr. Dakin	Poplar

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1853	Hayward, Charles	Mr. Tomlinson	Lincoln
1856	Head, John T.	Mr. Head	Lewes
1850	Headley, William	Mr. Headley	Bridlington
1850	Heap, Edward	Mr. Wylde	Manchester
1848	Henwood, Nicholas L.	Mr. Geldard	Plymouth
1853	Herbert, Henry	Mr. Groves	Blandford
1843	Hill, William	Mr. Rowe	Plymouth
1856	Hill, William	Mr. Gardner	Edinburgh
1851	Hill, William R.	Mr. Tylee	Bath
1857	Hill, Francis	Mr. Reinhardt	Leeds
1854	Hinton, Archibald	Mr. Curtis	London
1856	Hoare, James Roper	Mr. Gigner	Chelsea
1852	Hodgkinson, John S.	Mr. Brooker	Macclesfield
1852	Holliday, Joseph	Mr. Wilding	Liverpool
1856	Holland, William	Mr. Sibary	Longton
1857	Holmes, William C.	Mr. Stocken	London
1855	Holmwood, William C.	Mr. Coppock	Bridport
1855	Holt, George F. W.	Mr. Obbinson	Sleaford
1855	Holt, William Henry	Mr. Paulden	Altrincham
1854	Horn, William	Mr. Longrigg	Appleby
1853	Huggins, Richard	Mr. Tanner	Exeter
1856	Hughes, Evan	Mr. Deane	Clapham
1854	Humphries, Henry A.	Mr. Grounds	Ludlow
1852	Hunter, George	Mr. Garbutt	Gateshead
1853	Hustwick, Thomas H.	Mr. Coupland	Harrogate
1843	Ince, Joseph	Mr. Ince	London
1856	Iverach, John G.	Mr. Iverach	Kirkwall
1856	Jackson, Warwick	Mr. Hitchcock	Colchester
1856	Jackson, John	Mr. Wilson	Bradford
1853	Jacob, John R.	Mr. Bowers	Chester
1855	Jakins, George S	Mr. Golding	London
1854	Jefferson, Thomas	Mr. Deck	Cambridge
1853	Jones, Charles W	Mr. Jones	Carmarthen
1850	Jones, Humphrey	Mr. Higgins	Chester
1856	Jones, Peter Cooke	Mr. Jones	London
1853	Jones, Richard L.	Mr. Jones	Narberth
1853	Judd, William	Mr. Savage	Brighton
1855	Keene, John	Mr. Savage	Brighton
1856	Kemp, Francis	Mr. Smeeton	Leeds
1856	Kent, Frederick W.	Mr. Randall	Southampton
1851	Kent, William H.	Mr. Buck	Colchester
1854	Knight, John A.	Mr. Arnold	Norwich
1852	Laffer, Edmund H.	Mr. Fowler	Torrington
1855	Lamplough, John	Mr. Stephenson	Derby
1857	Langley, William	Mr. Tylee	Bath
1857	Lavers, Thomas F.	Mr. Lavers	Lewisham
1853	Lawrence, George	Mr. Wright	London
1856	Lawrence, Henry	Mr. Watkins	Stratford
1853	Le Feuvre, Francis	Mr. Ereaut	Jersey
1851	Lees, James	Mr. Clarke	Richmond
1853	Long, Alfred	Mr. Noakes	Brighton
1857	Lovatt, John Hammond.	Mr. Wilshaw	Wordsley
1857	Machon, Edward	Mr. Parkes	Manchester
1855	Madgwick, William B.	Mr. Huggins	Alresford
1855	Malin, Edmund C. M.	Mr. Huggins	Barnet

Date of Registration	NAME.	RESIDING WITH.	TOWN.
1850	Manthorp, George	Mr. Manthorp	Colchester
1847	Marrack, George M.	Mr. Searle	Crediton
1852	Marrack, Philip	Mr. Searle	Crediton
1853	Marston, Alfred	Mr. Cocking	Ludlow
1857	Martin, Benjamin	Mr. Handley	Wakefield
1856	Martin, James	Mr. Palk	Southampton
1857	Mason, John	Mr. Mason	Hastings
1853	Matthews, Charles	Mr. Gostling	Diss
1856	Mathias, Thomas	Mr. Jones	Narberth
1853	Maudsley, William	Mr. Barnes	Preston
1855	May, Augustus S.	Mr. Greenwell	London
1855	M'Cabe, Dunbar	Mr. Macfarlane	Edinburgh
1857	Midgley, John James	Mr. Reinhardt	Hull
1856	Miller, Duncan S.	Mr. Pooley	Bath
1856	Mohun, Martin	Mr. Argles	Maidstone
1856	Monger, Hamilton S.	Mr. Gay	Stroud
1856	Morley, Edward	Mr. Asling	Spalding
1856	Morley, George	Mr. Wheeler	Hackney
1853	Moverley, Robert	Mr. Dingley	Maidstone
1856	Newby, John	Mr. Hughes	Altrincham
1853	Nicholson, Frederick	Mr. Watts	London
1852	Nicholson, John J.	Mr. Ritson	Sunderland
1852	Nock, Thomas	Mr. Caddick	Newcastle
1855	Norrish, James	Mr. Searle	Crediton
1851	Nosworthy, Robert	Mr. Husband	Exeter
1847	Orpe, Thomas M.	Mr. Walton	Derby
1849	Ough, William	Mr. Jeffrey	Devonport
1856	Overton, William	Mr. Fowke	Stafford
1847	Owen, Thomas R.	Mr. Mease	South Shields
1852	Owles, James	Mr. Owles	Yarmouth
1856	Owles, Edward J.	Mr. Palk	Southampton
1852	Pain, Walter E.	Mr. Pain	Cambridge
1853	Parr, Robert	Mr. Wellington	Oakham
1852	Pattison, Henry	Mr Hooper	Brighton
1855	Paxton, William M.	Mr. Mitchell	London
1853	Peacock, Hamerton	Mr. Peacock	London
1853	Pearce, Henry T.	Mr. Pearce	Gloucester
1853	Phillips, John Dutton	Mr. Dennison	Dudley
1853	Pilcher, William J.	Mr. Davis	Folkestone
1855	Pitman, John	Mr. Fendick	Bristol
1853	Potter, James H.	Mr. Binnington	London
1855	Potts, Robert A.	Mr. Potts	London
1854	Power, Thomas M.	Mr. Williams	Nottingham
1854	Pratt, James	Mr. Nunn	Bury St. Edmunds
1856	Price, Thomas	Mr. Laen	Pembroke Dock
1848	Pullan, John R.	Mr. Gascoigne	Harrogate
1853	Quinlan, Joseph	Mr. Times	London
1855	Radermacher, George	Mr. Bartlett	Chelsea
1855	Rae, John Inglis	Mr. Mackay	Edinburgh
1853	Rawling, John W.	Mr. Oldham	Wisbeach
1856	Rea, James Parker	Mr. Rea	London
1857	Reed, Alfred	Mr. Gordelier	Sittingbourne
1854	Reeves, Robert	Mr. Gordelier	Sittingbourne
1857	Renaud, Monchery	Mr. Deane	Clapham

Date of Registration	NAME.	RESIDING WITH.	TOWN.
1856	Reynolds, Freshfield	Mr. Martin	Guildford
1853	Richards, Thomas L.	Mr. Bowers	Chester
1853	Richardson, Thomas	Mr. Bally	Baldock
1852	Riley, James	Mr. Smith	Sutton Coldfield
1852	Rivers, Henry	Mr. Hornsby	Odiham
1853	Roberts, Albinus	Mr. Williams	Horsham
1856	Roberts, John L.	Mr. Sibary	Longton
1853	Robinson, William P.	Mr. Edwards	Liverpool
1853	Rodd, George P.	Mr. Harrington	Rayleigh
1853	Rosevear, Drew V.	Mr. Palk	Exeter
1856	Rosselloty, John C.	Mr. Couch	Islington
1851	Roust, George	Mr. Bolton	Tenterden
1853	Rubbra, Frank	Mr. Hope	Wellingborough
1853	Salmon, Henry L.	Mr. Moore	Brighton
1855	Sanger, William A.	Mr. Maitland	London
1846	Savory, Thomas H.	Mr. Savory	London
1846	Savory, Charles H.	Mr. Savory	London
1854	Saxby, Henry	Mr. Saxby	Lewes
1853	Say, Edmund H.	Mr. Cooke	Norwich
1855	Scarlin, James H.	Mr. Marchant	Ipswich
1857	Seymour, George	Mr. Roose	Oldbury
1845	Shepheard, Thomas	Mr. Gulliver	Lutterworth
1854	Shepley, Samuel	Mr. Claughton	Chesterfield
1857	Sheriff, Thomas	Mr. Macfarlane	Edinburgh
1855	Simpson, Thomas	Mr. Allen	Boston
1852	Sinclair, George	Mr. Gilpin	Newcastle
1854	Slater, Henry	Mr. Asling	Spalding
1856	Slator, Thomas	Mr. Pilley	Boston
1856	Smart, Benjamin	Messrs. Lea and Co.	Worcester
1853	Smith, Frank de Carle	Mr. Wright	London
1854	Smith, Frederick	Mr. Foster	Ludlow
1852	Smith, Edward	Mr. Lynch	Manchester
1845	Smith, James W.	Mr. Coulson	Scarborough
1852	Smith, William	Mr. Sumner	Birmingham
1852	Southall, Joseph S.	Mr. Harvey	Leeds
1855	Spearing, James	Mr. Dowman	Southampton
1854	Stanway, William H.	Mr. Blandford	London
1857	Stapelton, Thos. Glode.	Mr. Collins	London
1853	Stevens, H. W.	Mr. Hitchcock	Colchester
1856	Stokes, Edward H.	Messrs. Lea and Co.	Malvern
1852	Stokoe, Thomas	Mr. Reinhardt	Hull
1853	Sturges, William T.	Mr. Gudgen	Kimbolton
1855	Sturton, John R.	Mr. Sturton	Peterborough
1853	Swift, William	Mr. Judson	Ripon
1857	Syer, John Witham	Mr. King	Soham
1856	Tanner, Augustus F.	Mr. Dickinson	London
1853	Taylor, Samuel	Mr. Tonge	York
1853	Teasdale, Thomas	Mr. Myers	Newcastle
1855	Teed, David	Mr. Pasmore	Exeter
1854	Thomas, George S.	Mr. Outhwaite	Bradford
1856	Thomson, Denzil	Mr. Witherington	Worcester
1853	Thompson, John R.	Mr. Thompson	Thirsk
1853	Tollinton, Richard B.	Mr. Jackson	Stowmarket
1857	Touzeau, James Fred.	Mr. Arnold	Guernsey

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1857	Touzeau, John Arnold...	Mr. Arnold.....	Guernsey
1849	Tovey, Charles	Mr. Witherington ...	Worcester
1848	Toovey, Richard	Mr. May	Reading
1856	Towerzey, Alfred G.....	Mr. Towerzey.....	London
1857	Trewavas, Richard J. ...	Mr. Job.....	Truro
1856	Trotter, Joseph	Mr. Brown	York
1855	Tuck, John	Mr. Martin.....	Trowbridge
1853	Tucker, Henry	Mr. Kinch	Henley-on-Thames
1853	Turner, John	Mr. Payne	Aylesbury
1856	Twinberrow, James R....	Mr. Twinberrow.....	London
1854	Twinberrow, John	Mr. Watts	London
1855	Underdown, Fred. W....	Mr. Hall	Canterbury
1855	Videon, Charles	Mr. Whitmore	London
1855	Vooght, William	Mr. Twinberrow.....	London
1846	Wakefield, Cecil H.....		Worcester
1849	Walker, Charles	Mr. Walker	Hogsthorpe
1854	Walker, Joseph	Mr. Witherington ...	Worcester
1857	Walker, George.....	Mr. Goodhall.....	Derby
1857	Wall, John Thomas.....	Mr. Butcher	Cheltenham
1853	Walls, Thomas.....	Mr. Barber	Liverpool
1856	Walsh, Edward.....	Mr. Argles	Maidstone
1852	Walters, William	Mr. Tanner.....	Exeter
1855	Walton, Ralph	Mr. Ritson	Sunderland
1856	Ward, Shaw	Mr. Lofthouse.....	Hull
1846	Warner, George F.		Nottingham
1852	Watson, James B.	Mr. Filt	Barking
1853	Watson, William	Mr. Chapman.....	Ipswich
1857	Watson, Richard T.....	Mr. Dobinson.....	Bishop Wearmouth
1857	Watts, John Newton	Mr. Watts	London
1856	Waugh, Alexander	Mr. Randall.....	Southampton
1850	Wells, Edwin	Mr. Grounds	Ludlow
1853	Wheeler, James	Mr. Payne	Aylesbury
1856	Wheeler, Joseph	Mr. Owen	London
1848	Whincup, William	Mr. Coupland.....	Harrogate
1856	White, James W.....	Mr. Iverach	Kirkwall
1856	White, John G.....	Mr. Ransome	Hitchin
1856	Whitehouse, George H...	Mr. Tonge	York
1853	Whittle, Thomas	Mr. Davies	Chester
1852	Whitworth, John.....	Mr. Lowe	Liverpool
1850	Willcox, John	Mr. Hollier.....	Dudley
1853	Williams, Frederick	Mr. Anderson	Worcester
1856	Willsher, Stephen Henry.	Mr. Bolton	Tenterden
1852	Wilson, William	Mr. Rainey	Spilsby
1853	Wiltshire, Alfred	Mr. Pearce	Gloucester
1856	Witherington, Henry ...	Mr. Witherington ...	Worcester
1853	Wood, Edmund	Mr. Pooley	Bath
1854	Wood, John Robert.....	Mr. Simonds	Boston
1857	Wood, Albert	Mr. Watkins.....	Walsall
1852	Yarrow, George S.	Mr. Fox	London
1855	Yerworth, Edward	Mr. Binge	Pimlico
1853	Young, John.....	Mr. Anderson.....	Musselburgh
1853	Young, Ralph	Mr. Gilpin	Newcastle
1857	Young, John.....	Mr. Mackay	Galashiels

NAMES OMITTED FROM LIST PUBLISHED JULY 1st, 1857.

ASSOCIATES OF THE SOCIETY

WHO HAVE PASSED THE MINOR EXAMINATION.

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1857	477	Andrew, Leyshon	Swansea
1855	461	Brown, John	London
1857	470	Chrispin, William	Sand Hutton
1856	478	Fletcher, John	Camberwell
1857	455	Grimwood, William	Ipswich
1857	471	Harrow, Henry	Tunbridge Wells
1854	479	Jefferson, Thomas	Cambridge
1857	469	Lee, John William	London
1855	475	Madgwick, William Butler	Alresford
1857	476	Mee, George	Woolwich
1856	452	Pearson, Edward Smith	Liverpool
1857	460	Robinson, John	Woolwich
1857	481	Scott, Joseph Robinson	Sheffield
1857	473	Tieftrunk, Julius	London
1855	466	Tuck, John	Trowbridge
1857	465	Wheldon, Henry William	Atherston

ASSOCIATES OF THE SOCIETY

WHO HAVE PASSED THE MAJOR EXAMINATION.

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1857	466	Cornelius, James	Clapham
1857	468	De Valancé, C. P.	Matritius
1857	460	Dixon, Henry	Grantham
1857	458	Glass, John Thomas	Ryde, I. W.
1857	476	Iverach, John G.	Kirkwall
1857	467	Skinner, Henry	Horncastle
1857	475	Smith, William	Glasgow

MEMBERS.

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1853		Lane, Joseph	Hampstead
1853		Leach, John	New Cavendish St.
1853		Martin, Thomas	Clapton
1844		Morton, George	Stratford-le-Bow
1856		Reilly, William Charles	Hampstead
1842		Watkins, John	Stratford-le-Bow

ERRATA.

Page 56. Kershaw, George—*prefix* No. of Certificate, 81.
" 56. Lacy, Benjamin W.—*for* 63, Lupus Street, *read* 13, Westbourne Grove, Bayswater.
" 58. *For* Simmonds, Joseph, *read* Simmons, Joseph.
" 59. Watts, Henry J.—*for* 8, *read* 11.
" 62. Bentley, Walter—*prefix* No. of Certificate, 177.
" 68. Elsey, Charles—*prefix* No. of Certificate, 258.
" 69. Fairbarn, George—*prefix* No. of Certificate, 361; and *for* 1857, *read* 1853.
" 69. Farmer, James—*prefix* No. of Certificate, 26.
" 74. Hornsby, George—*prefix* No. of Certificate, 174.
" 84. Russell, Charles J. L.—*prefix* No. of Certificate, 84.
" 85. Smith, William—*prefix* No. of Certificate, 169.
" 95. Smeeton, G. H.—*instead of* Birmingham, *read* Leeds.
" 95. Weston, Charles—*instead of* 1856, *read* 1857.
" 98. *For* Beach, Thomas, *read* Beach, Tom Clarke.
" 100. Fletcher, John—*transferred to* page 96.
" 104. Tuck, John—*transferred to* page 97.
" 104. *For* Ward, Shaw, *read* Shaw, Ward; and *for* 1856, *read* 1855.

INSTRUCTIONS TO THE BINDER.

The two pages, Nos. 49 and 50, are to be substituted for the corresponding leaf, and the page of *Errata* stitched in at the end of the list.

THE PHARMACEUTICAL JOURNAL.

VOL. XVII.—No. II.—AUGUST 1st, 1857.

THE EXAMINATIONS OF THE PHARMACEUTICAL SOCIETY.

The regulations of the Board of Examiners having been recently revised, are printed entire in the Transactions of the Society for the present month. No material alteration has been made in the Examinations during the last two or three years; but it was thought desirable to reprint the Regulations in consequence of the numerous inquiries of correspondents, and in so doing care has been taken to give in a concise form the most explicit information respecting the subjects with which Candidates should make themselves familiar.

The Classical Examination, which is the first step or initiation into the business, is a very lenient one, and this must of necessity be the case so long as the Society occupies its present merely honorary position. It would be impolitic at the threshold of a voluntary institution to place a formidable barrier calculated rather to discourage than to stimulate those whom it is desirable to attract within the pale as its future Members. It is necessary, however, that a certain amount of elementary knowledge should be possessed by those who are destined for the responsible duty of dispensing prescriptions and performing chemical or pharmaceutical processes, and it is considered that the Latin language and arithmetic constitute the groundwork of the requisite education. An acquaintance with the elements of mathematics and physical science, with some knowledge of modern languages, would be an additional advantage, and the parents of Pharmaceutical Students are advised not to limit the academical instruction of their sons to that which is absolutely required by the regulations at the present time, but to bear in mind the general progress of knowledge and the great importance of early training in promoting success in a scientific profession or business.

The first step having been taken, and the Student having become a Registered Apprentice, his connexion with the Society, whose Transactions he receives monthly, brings continually before his mind the course which he ought to pursue in completing his education. During the few succeeding years he is looking forward to the Minor Examination, which should be passed towards the close of his apprenticeship, or on attaining the age of twenty-one. The sooner he can qualify himself the more valuable will his services become, and his interest in the business will increase in proportion. To those young men who reside in the metropolis, or in the neighbourhood of a scientific or medical school, the opportunity of attending lectures is an advantage which should not be neglected. This does not supersede the necessity for private study and reading, but serves to direct the attention to a proper channel, and to induce a methodical habit of acquiring and retaining information. Our number for January, 1853, contains some remarks on this subject, addressed to Apprentices and Students preparing for examination, and giving general instructions as to the course of study recommended and the class of works most likely to be found useful. These instructions have been reprinted, and are forwarded by post in reply to correspondents desiring such information. By diligent attention to the suggestions offered, young men who are thrown almost entirely on their own resources for improvement may qualify themselves and acquire distinction, of which not a few examples have come under the notice of the Board of Examiners.

The acquirement of scientific knowledge is, however, most effectually secured by attendance at a practical School of Chemistry or Pharmacy; and the establishment of the Pharmaceutical Society is adapted expressly to this purpose. The regulations of the Board of Examiners do not, as in some institutions, require the production of certificates of attendance at a certain number of lectures, nor is there any rivalry between the School of Pharmacy in Bloomsbury Square and other establishments where Chemistry is taught. The School is not a speculation from which a pecuniary return is, or could be, obtained. It is kept up, at a very considerable expense, for the benefit of the Students themselves, and as a means of promoting the improved qualification of Pharmaceutical Chemists. The lectures are free, not only to Members and Associates, but to candidates preparing to pass the examination; and this privilege includes admission to the Botanical Gardens in the Regent's Park. The course of study in the Laboratory is adapted to the same end, and is not supported by the Students, the fees not being nearly sufficient to defray its current expenses; and no increase in the number would make it remunerative to the Society. There is, therefore, no ground for the supposition that any favour is likely to be shown to candidates for examination who are, or have been, Students in the school. If this had any influence it would be rather in the opposite direction, for the following very obvious reason:—Supposing the qualifications of a candidate to be so nearly on the balance that the question of his passing comes to a casting vote; if it should transpire that he acquired all the knowledge he possesses in a country town by his own unassisted industry, it might be fairly inferred that any deficiency would soon be made up by perseverance in the same course of study; but if the candidate had enjoyed all the advantages of a practical School of Pharmacy, and nevertheless had made so little progress that his passing the examination becomes a doubtful question, the decision would be more likely to go against him, and he would have no cause for complaint. It should, therefore, be clearly understood that the school is intended for the benefit of the Students, who, by "patronising" it, confer no favour on the Society, but, on the contrary, incur an obligation, which it should be the business of their lives to discharge by maintaining its character as its future Members.

SECRET REMEDIES.

According to the strict theory of professional ethics there is no disguise or mystery between medical men. Each imparts freely and disinterestedly the knowledge which he has acquired by experience; and the satisfaction of relieving suffering, and contributing to the advancement of medical science, is the recompense of his researches. The discovery of new remedies or improved methods of treatment may raise his reputation, and thus extend his practice, but he claims no exclusive right to the emolument arising from his discoveries, the result of which he communicates without reserve at meetings of societies or through the medium of the press. The time and the mode in which communications of this nature are made to the profession must depend upon circumstances, in reference to which each individual exercises his discretion; but concealment or mystification with a view to pecuniary advantage would be considered derogatory. During the progress of preliminary experiments it might be premature to divulge the theory or doctrine upon which a new mode of treatment is founded, or to give publicity to any opinion as to the supposed efficacy of a remedy, the merits of which have not been fully tested. The time for publishing the discovery, if it be one, will depend on the period required for the completion of the evidence; and the author, supposing him to be disinterested, will only wait for the confirmation of his expectations by a satisfactory result.

The recent researches of Dr. Fell in the Middlesex Hospital have given rise to discussion in the profession, and some difference of opinion appears to exist

as to the propriety of permitting a secret remedy to be tried in a public hospital. The circumstances under which this permission was granted, are stated in another part of this number, and the publication by Dr. Fell of his *Treatise on Cancer and its Treatment* exonerates him from any supposed intention of mystification which some parties had imputed to him. The medical officers of the hospital who sanctioned the proceedings of Dr. Fell have fallen under the lash of a rather cutting periodical with which one of them had previously been in collision in reference to another subject. The asperity of the criticism being thus accounted for, the question between Dr. Fell and the profession rests on the merits of the discovery. It is not strictly correct to apply the term secret remedy to a course of treatment the nature of which was known by the medical officers of the hospital, under whose surveillance the proceedings took place.

Dr. Churchill, of Brompton, recently addressed a letter to the Governors of the Hospital for Consumption, requesting the opportunity of testing the value of a secret remedy for consumption, on terms similar to those made between Dr. Fell and the authorities of the Middlesex Hospital. Dr. Churchill states that his remedy is a specific for this disease; and he asks for the exclusive care of ten patients, to be selected by himself, with the understanding that, if the result should be successful, he will reveal his secret; if otherwise, he will be free to do as he may think proper. He complains, in a letter to the *Medical Gazette*, that the authorities of the hospital have not answered his communication. The editor of the *Medical Gazette* observes—

"We consider that it is quite unworthy of any member of our Profession to conceal from his fellow-practitioners and the public the nature of any remedial agent which he may employ in the treatment of disease; and experience has taught us (without making any reference to Dr. Churchill) that those who adopt such a practice are either actuated by unworthy motives of a personal and pecuniary nature, or that their supposed specifics have no real claim to attention."

The request for permission to practise on the patients of an institution, with a view of testing a secret nostrum, the nature of which is not stated even in confidence to the medical officers, appears on the face of it unreasonable and absurd.

Some years ago a person endeavoured to introduce into the London Fever Hospital "an infallible specific" for fever, being a liquid to be applied to the entire surface of the body. By the influence of one of the officials, a patient was stripped and subjected to the experiment, when the senior Physician happened to come into the ward, caught the experimentors in the act, put a stop to the proceedings, and strictly prohibited the introduction of any quackery into the hospital in future.

There is a legitimate mode of testing the efficacy of a new remedy or plan of treatment, and medical men in private practice as well as in the hospitals are continually endeavouring to advance science and introduce improvements in therapeutics; but as a general rule, a secret medicine with the profession may be compared to an anonymous letter sent to the *Times*, which, unless authenticated confidentially, is thrown into the waste paper basket.

Descending on the sliding scale between the *professional* and the *commercial* view of the subject, a variety of perplexing and intricate questions arise, of which we may give a few examples.

A manufacturing Chemist is not expected to reveal, for the information of the profession, the methods by which he obtains the most satisfactory results. He learns by experience how to economise his materials, simplify his processes, and obtain from refuse or residuary products fresh sources of remunerative return. It matters not how he manipulates his bark or his opium, so long as the alkaloids which he produces will stand the usual tests, and compete favourably with other samples in the market. His laboratory is forbidden ground, except to his work-

men or assistants, who are bound to secrecy, and many of his processes are known only to himself. He may in his profession rank with such men as Orfila or Pelouze, and yet in his den he wears a padlock on his lips.

The Pharmaceutical Chemist has his share of competitive manipulation. His processes admit of improvement or simplification, and he vies with his neighbours in producing the best results. His ambition may lead him to researches in the course of which he makes a practical and useful discovery—for example, a sedative solution of opium. Much time and labour may have been consumed, and expense incurred, during the course of his experiments, and the result, when tested in the hospitals, is found to realize his most sanguine expectations. The fame of his "Liquor Opii" spreads; the demand increases; but it is a secret medicine, he has not divulged the process by which it is prepared.

A hardware manufacturer at Birmingham invents a button possessing certain advantages over other buttons, and likely to have an extensive sale. The law provides a special protection in this class of cases. The inventor takes out a patent, he secures to himself an exclusive right over his button, he becomes an important man, and makes a fortune. Which of these two persons has conferred the greatest benefit on mankind, the Chemist or the button-maker? Surely the Chemist, yet he is protected by no patent, and is even subjected to ill-natured remarks for not at once publishing his formula, and sacrificing any pecuniary advantage which he might obtain from his invention.

It was formerly the custom to protect inventions of this nature by patents, and hence originated the term patent medicine, which is now used with a more extended application, comprising proprietary medicines generally, to which the Medicine Stamp Act applies. Dr. James's Fever Powder is one of the few patent medicines in the strict sense of the term still extant, and although a secret medicine, it is ordered in prescriptions in all parts of the kingdom. Sir William Burnet has secured to himself a patent for the use of Chloride of Zinc as a disinfecting fluid. Jeremy's Solution of Opium is a secret proprietary medicine not protected by patent, but frequently prescribed by medical men. Chlorodyne is another instance of a secret medicine enjoying similar patronage, and a solution of meconate of morphia is constantly prescribed, although the mode of preparing it has not been published. In another part of this number there is some correspondence on the subject of a patent for coating pills, which has given rise to sarcastic remarks. Passing from these equivocal cases, we come to the motley group of quack medicines, with their printed directions and certificates, authenticated by the signature of the maker, adorned with a stamp, and many of them puffed with persevering ingenuity in the local and general newspapers. This class of medicines, paraded as they usually are *ad captandum vulgus*, have no pretensions to professional character. They are sold by Chemists as a branch of ordinary trade in obedience to the public demand, but a Medical Man would consider himself degraded by the imputation of being a vendor of patent medicines.

With regard to certain equivocal cases of which we have given examples, it is not so easy to lay down a specific rule. While medical men regularly prescribe "Pulvis Jacobi Verus," Batley's Liquor Opii Sedativus, Braithwaite's Black Drop, Squire's Meconate of Morphia, Savory's Tincture of Sumbul, Jeremie's Solution of Opium, Dr. J. Collis Browne's Chlorodyne, and other preparations, the formulæ for which have not been published, where should the line be drawn between legitimate secret medicines and quack medicines? and who is to blame a Chemist for not disclosing the formula for a preparation for which he has a reputation, while Medical Men sanction and encourage nostrums by ordering them in their prescriptions?

We think the only mode of solving the question and meeting the difficulty is the following:—The author of a discovery or invention has the option of electing between two courses which are open to him. He may either take high ground,

and comply with the rules of ethics adopted and recognized in the Medical Profession, publishing the result of his labours or ingenuity, and taking the credit as his reward; or he may take a commercial position, placing himself in the same category with button-makers and other respectable tradesmen, who, having no aspirations to professional dignity, sell their wares at the best price they can get in the market, and recommend them to public notice in the manner most suited to the object in view, which is pecuniary return.

In a subject of such delicacy, relating as it does to the discretionary arrangements of individuals in the conduct of their business, we can do no more than suggest what appears to us to be a proper distinction between the professional and the commercial view of the question; and being frequently appealed to with reference to cases of quackery and puffing, we may observe in general terms that the adoption of the style of handbill and advertisement usually resorted to by the vendors of quack medicines is undesirable, and derogatory to the character of Pharmaceutical Chemists, and should be discouraged by those who desire to see our body recognized as a branch of the profession.

THE ADULTERATION OF FOOD OR DRINK.

The Parliamentary Committee on Adulteration has resulted in "a Bill for preventing the Adulteration of Articles of Food or Drink." These latter words are stated in the definition clause to "include not only all alimentary substances, whether solids or liquids, but also all eatables or drinkables whatsoever, not being medical drugs or articles usually taken or sold as medicines." Notwithstanding this exclusion, the measure comprises many of the articles which are sold by Chemists and Druggists, especially in country towns, where pharmacy and grocery are frequently allied. The same machinery for detection and punishment is applicable to all branches of trade in which adulteration prevails, and whatever may be the decision of the Legislature in regard to food, it is probable that physic will follow, although the two subjects are for the present kept distinct. We must therefore deal with the question as a whole, and take the Bill before us as an instalment of the contemplated restrictions on fraud and adulteration, and as a specimen of a species of legislation, undertaken with a praiseworthy object, but founded on theoretical speculations, which require to be submitted to the test of practical experience.

We have printed the Bill entire in another part of this number, that our readers may judge for themselves as to its merits; and although we believe its authors and promoters do not expect it to pass in its present form, it is desirable that their objects and intentions should be clearly understood, and the principles of the measure duly considered.

It will be observed that the maxim "*caveat emptor*" is altogether discarded with reference to the consumers, while it is made to fall with redoubled severity on the purchasers of goods to sell again. According to the theory of the Bill, the public must be protected against fraud, and every person requiring for his own use an ounce of tea or a pound of chocolate, may go blindfolded to the nearest shop; but the grocer or chandler, in purchasing his stock, is held responsible for any defect which may be found or suspected to exist in any of his goods. It is not necessary to prove a guilty knowledge on his part; the *onus probandi* is thrown upon the accused, who, unless he can prove a negative, is held to be guilty, and liable to fine, confiscation, and imprisonment. But this is not all. By the ninth section the food inspector is empowered to seize any substance which he supposes to have been "intended to be mixed with any article of food, &c.," and which, if so mixed, would prove injurious; and upon the conviction of the party (that is to say, in case he should fail to prove that he did not intend so to mix it), he is liable to the pains and penalties of the Act.

The suppression of fraud is an object in which every honest man is interested;

but the attempt to attain this object by a system of espionage and persecution, involving alike the innocent and the guilty, is a violation of the principles of justice, and would open the door to a still more complicated series of abuses.

It should be observed that the appointment of food inspectors and chemical food examiners (under the third section) is compulsory in every town or district in which a "local authority" exists. Under the most favourable circumstances, and with officers fully competent and trustworthy, it would be extremely difficult to administer such a law efficiently and equitably; but in country towns, where its provisions might be unpopular or imperfectly understood, and where an unwilling compliance with the required form, at the smallest possible expense, would be the result, the extent of the abuses to which such a system is liable could scarcely be estimated, except by those who have smarted under the surveillance of the Excise, or have had dealings with officials through whom Government contracts are obtained. It is well known that the salaries of this class of persons bear no definite proportion to their incomes, and numerous are the instances in which innocent men have been sacrificed to the cupidity of inspectors, whose favour they declined to propitiate in the regular way.

The grocers are aware of the liabilities to which their trade would be exposed if such a Bill as the one before us were to become the law of the land, and they have held meetings on the subject, at which resolutions have been passed, similar in substance to the following:—

"*Reasons against the Bill for Preventing the Adulteration of Articles of Food and Drink.*

"Because such Bill would call into existence a host of inquisitors, armed with powers for mischief greater than those possessed and exercised by the exciseman of former days, and at an enormous expense to the ratepayers:

"Because the Bill seeks further to interfere with the freedom of trade by the appointment of a Metropolitan Board, with the mischievous power of deciding for the manufacturer and tradesman how they shall conduct their business; and because the creation of such dictatorial power in commercial matters cannot but be prejudicially restrictive, and offensively obtrusive:

"Because the Bill proposes to inflict the penalties of fine, forfeiture, imprisonment, and judicial exposure, not only for offences against the public health, but *and equally* for the innocent and frequently necessary admixture of innoxious ingredients for merely commercial purposes:

"Because the Bill subjects the honest trader—upon whom suspicion has never fallen—to a vast amount of inconvenience and hindrance at all hours of business, and of expense and trouble, at the whim or caprice, prejudice, spite, or malice, of an irresponsible local official:

"Because the Bill, in defiance of the moral law and constitutional axiom, that innocence is to be assumed where guilt cannot be proved, proposes the condemnation and punishment of the accused, because of his inability to establish a negative—placing the trader who may in perfect good faith have upon his premises a suspected article in an infinitely worse position than the alleged murderer:

"Because the Bill extends the convicting powers of the Magistracy over tens of thousands of the trading classes, and deprives them of the constitutional right of trial by jury, in cases which may be in themselves trivial, yet which, under the proposed Act, are made to involve consequences affecting character, property, and personal liberty at the instance of a commercial police:

"Because, to seek that which is desirable by means which are unjust and oppressive, is to do evil that good may come, without the remotest probability of the good which may be affected being anything like an equivalent for the wrong which may be inflicted:

"Because the Bill appears specially calculated for ministering to the bad feelings and facilitating the vengeance of dishonest and discarded servants."

The prevailing mistake of modern legislators is the disposition to attempt too much, and to invent cumbersome and expensive machinery for the accomplishment of objects for which less complicated means would be more satisfactory, and quite as effectual. In the present instance, the salaries of officers, the rent

of warehouses, and other appliances proposed in the Bill, would entail so heavy an expense, that it would be much cheaper for the public to pay a fair price for their provisions; and this would, at the same time, be the most effectual mode of keeping adulteration in check, as the substance of the evidence before the Parliamentary Committee went to show that the most fertile source of fraud and adulteration is the "cutting," or underselling system, and the eagerness of the public to run after bargains, and buy goods at half their value.

It is undoubtedly desirable that every possible facility should exist for the detection and punishment of flagrant cases of fraud, and for this purpose the services of the officers of health already appointed in many parishes might be made available. Dr. Thomson, in a report to the Marylebone Vestry, on the adulteration of bread, published in our last number, undertakes to put an end to this evil within a short space of time, if allowed the services of an additional assistant at an expense not exceeding £100 per annum. The same course of action could be extended to other descriptions of provision, and thus at this very moderate expense a remedy for the abuses in question is offered to the local authorities of a parish containing upwards of 157,000 inhabitants. But on the discussion which arose at the reception of the report, considerable opposition was manifested to this further innovation on the parish purse, and it seemed to be a general opinion that the local taxation for sanitary purposes had of late increased so much, that some limit ought to be placed on this mania. It is probable that the moderate proposal of Dr. Thomson might with some exertion be carried, but fearful would be the indignation of the vestry if an attempt were made to introduce the extravagant schemes of the Bill now before us.

THE PROGRESS OF THE POISON BILL.

The Committee not having yet presented a report to the House of Lords, it is not likely that this Bill will come to maturity during the present Session. We have grounds for believing that very considerable amendments are in contemplation, and that, besides the partial or entire removal of several sections, it is proposed to add some new provisions, which will materially change the complexion of the Bill. We are not in a position to give more explicit information on the subject at present, but the above statement will be sufficient to assure our readers that the Bill, in the form in which they are acquainted with it, is not likely again to appear, except in the pages of history.

We have received several communications on the subject, which we have not space to publish, but some of the remarks may be briefly noticed. A correspondent in Dublin observes that Lord Granville must have been greatly misinformed with regard to the angular bottle and pot scheme; he says, "the plan was never even partially adopted in any part of Ireland beyond the limits of the city of Dublin, and all practical Pharmaciens on this side of the channel agree in looking upon the measure as one fraught with additional danger, rather than security, to the public, and in this opinion I believe they are in accordance with the greater part of the physicians of this city, who, with two or three exceptions, never expressed any anxiety in its favour."

Mr. Thompson, of Thirsk, mentions a case in which solution of archill was taken by mistake, instead of elder syrup, affording an illustration of the security to be expected from the use of this article, so strongly recommended by the Legislature for the avoidance of blunders.

Another Member takes the opportunity of alluding to the danger arising from the absence of Chemists from home when attending on juries, and mentions an accident which occurred in his neighbourhood from this cause, the wife of the Chemist having given strong solution of ammonia instead of sal volatile. Such casualties are not unfrequent, and are very likely to occur where the shop, in the absence of the principal, is left in charge of his wife or a small boy.

Mr. Flower, of Matlock, points out the importance of certain precautions in the event of the adoption by Lord Granville of the suggestion of the deputation to open a register of all Druggists at the present time in business. He very properly observes, that unless due care be taken to ascertain that the parties claiming to be so registered have been regularly brought up to the business, a large number of chandlers and other unqualified persons will put in a claim, and thus acquire the status of Chemists and Druggists. In case the plan should be adopted, great care will be necessary in regulating the terms and conditions of registration, and the parties by whom, and the mode in which, it is to be carried into effect. We are fully prepared to deal with this part of the subject, but it would be premature to discuss it in detail at present. Mr. George Burrell, in a letter from which we quote the following passage, offers a suggestion, to which we propose an amendment, although we concur in some of the remarks:—

"In Miss Smith's case every precaution was taken that the law required, and which prudence could suggest; but still it must be disagreeable to our Glasgow brethren to have their names blazoned abroad in connexion with this singular case, independently of the annoyance of appearing as witnesses in a court of law. The Legislature may treat the nation as a community of children or madmen, whose natural tendencies are either to poison themselves or somebody else, and consequently shackle us so as to make it impracticable to sell poisonous substances, but to suppose that murder or suicide will be suppressed so long as hemp and steel and water are at hand, is obviously absurd. Every advance in science can be and *is* perverted to nefarious purposes, and the greater difficulty in procuring poison will inevitably lead to increased skill and ingenuity in effecting a murderous purpose. The true safeguard is that so long and ably advocated by the *Pharmaceutical Journal*, namely, increased intelligence on the part of the Chemist, and his *legislative recognition* as a scientific man. My present object, however, is not to discuss legislative measures, which we in the country may safely leave to the vigilance and good sense of the Council, but to suggest an expedient whereby the Chemist may *protect himself* from the *indirect* evils and annoyances which result from furnishing a poison bought with a murderous or suicidal intention. My suggestion is, that we should keep by us *innocuous imitations* of the most familiar poisons, and in all cases where there is the *slightest* doubt or uncertainty, to give the *fictitious* instead of the real poison. And they might be made so as to warn the victim and alarm the suicide. For example, I would colour bitrart. potash the same as arsenic, and add as much croton oil as would gripe or purge; and for strychnine I would give salicine or quinine, with sufficient tartar emetic in it to excite vomiting, and so on. I know this plan is open to criticism on the ground of selling a false for a genuine article, but I think if a crime could be prevented or a murderous intention revealed by such an artifice, few would be so strait-laced as to condemn it."

The amendment which we propose in preference to the plan above suggested, is, that whenever the suspicion of a criminal intention is sufficiently strong for such an artifice to be available, it would be better to refuse to sell the poison. If all would act in this way, the guilty party would soon be tired of going from shop to shop in vain.

We have observed with surprise the observations in some of the medical journals on the subject of the Poison Bill, and the entire ignorance (real or assumed) as to the nature and object of the opposition on the part of the Pharmaceutical Society. In the *Lancet* we are told that "the Druggists derive a considerable share of their yearly gain from the indiscriminate and unrestrained sale of poisonous substances to persons either too well acquainted with, or totally ignorant of their noxious qualities. It was therefore hardly to be expected that this profitable privilege would be resigned without a struggle."

In the *Medical Times and Gazette* we find a similar misapprehension, coupled with ingenious arguments, to make it appear that the Chemists are encroaching fearfully on medical men, and even aspiring to become physicians on a small scale. The practicability of the provisions of the Poison Bill is not at all discussed, but the measure is commended in general terms as a beneficent

emanation of Legislative wisdom. We have only lately ascertained the grounds of this very strong approval—namely, that as medical practitioners are exempted from the operation of the Bill, while Chemists are placed under restrictions, it is supposed that the measure would have the effect of transferring the major part of the sale and dispensing of medicines to the shops of the apothecaries, who, being exempted from interference, would enjoy a kind of monopoly. This supposition is ingenious, but the Bill has not passed yet.

THE FATE OF THE MEDICAL BILLS.

Much excitement prevailed on the occasion of the struggle between the two Medical Bills on the evening of July 1st. Mr. Headlam's Bill had for some time past maintained its position as the favourite; but the Government having lately declared in favour of Lord Elcho, it was rumoured that this circumstance might possibly turn the scale; and each party entered on the debate with an appearance at least of confidence as to the result. The anomalous state of the profession, with its numerous licensing boards and conflicting qualifications, furnished materials for attack on both sides, being as applicable to one as to the other; but the arguments of each with regard to the mode of rectifying the existing evils tended towards the same end—namely, a division in the profession, and a consequent defeat of all parties.

It had been mutually agreed that the discussion should be taken on the comparative merits of the two Bills; and, on a division, the numbers were, for the second reading of Mr. Headlam's Bill, 225—against it, 78—majority, 147. Upon the numbers being declared, Lord Elcho withdrew his Bill, leaving Mr. Headlam in possession of the field, with an apparent majority of three to one in his favour. This, however, was a fallacious triumph; for about that time the number of amendments (to Mr. Headlam's Bill) on the notice paper was between thirty and forty; and, on the 15th of July, Mr. Headlam became so fully sensible of the impossibility of proceeding another step that he withdrew his Bill, intimating a disposition to hand over the subject to the Government, to whom he promised his support, provided the principles of his own Bill were adhered to, but not otherwise.

Such is the natural consequence of discord and dissention in the Medical Profession, which is now about as far from the prospect of rectification as it has been for the last twenty years.

There is one feature in the late Medical Bills which is worthy of remark, namely, the intended repeal of the penal clauses of the Apothecaries Act of 1815, under which proceedings for illegal practice by unlicensed persons have hitherto been taken. We have been rather surprised to observe the general assent of the profession to this proposed removal of the restrictions on irregular practice, but we are informed that it was not likely that either of the Bills would pass in that form, as it was intended to re-exact the penalty clauses, or to introduce others to a similar effect in committee. This would of course raise the usual disputed question between free trade and restrictions, which is not likely to be passed over during the debates on any future Medical Bills, even though the provisions may have been advisedly omitted in the first edition, as matters for settlement at a future stage.

We do not consider the entire omission of such restrictions desirable, for, although the present state of the law entails upon our body the necessity of constant vigilance to guard against the possibility of injustice from undue severity in the interpretation of the law, yet the existence of some restrictive provision has a salutary effect, by operating as a moral restraint upon those who might be disposed to follow the bad example of our predecessors, the Apothecaries, in neglecting pharmacy and becoming by degrees Medical Practitioners.

THE DEFECTS IN THE EVIDENCE IN THE GLASGOW POISONING CASE.

The trials of William Palmer and Madeleine Smith will be handed down in the pages of history as parallel cases of medico-legal importance, which occupied about the same length of time in court, and caused an equal amount of public excitement. The prejudice of the public, however, was in the former case against, in the latter in favour of the prisoner.

Palmer's friends took the "odds" in his favour as they would have backed his racehorses, and were therefore personally interested in his acquittal. The friends of Madeleine Smith subscribed large sums of money—it is stated upwards of £4000—to pay the expenses of her trial; and, although the hopes originally entertained were not a little clouded by subsequent disclosures as the evidence proceeded, the prisoner continued to awaken so much sympathy and compassion, that she is described in the reports as being almost the only person in court who maintained uniform calmness and composure during the whole course of the trial. It is also a remarkable fact, that while even her most partial advocates have allowed the equivocal verdict to pass *sub silentio*, her escape from capital punishment has been satisfactory to all parties, and we believe there is but one opinion as to the propriety of the decision of the jury.

Whatever may be the private opinion of those who attended the trial, or who have read the reports with regard to the facts, there can be no doubt as to the incompleteness of the chain of evidence. The point chiefly relied on in the defence was the absence of proof that the deceased met the prisoner on the evening of his death. This is undoubtedly an important question, but less important, we think, than the question, how the quantity of arsenic described could have been administered by another person without the knowledge of the deceased? Eighty-eight grains having been found in the stomach, this could only have been a portion—and most likely a very small portion—of the quantity taken. Making allowance for the ejection of a portion by vomiting, the original dose could not be supposed to have been less than half an ounce, and the preparation of such a dose, effectually disguised, implies a skill in Chemical manipulation which, in an amateur, would certainly be remarkable. From the deposition of the prisoner, it may be inferred that she was asked no question as to the mode in which she purified the arsenic admitted to have been purchased, although the servant was questioned on the subject, and knew nothing. There is no evidence to show that the prisoner ever had any arsenic, except that which was coloured with soot or indigo, neither of which colouring matters were detected by the Chemical witnesses. It is therefore fair to infer, either that the prisoner was a skilful Chemical operator, or that the arsenic taken by the deceased was not the same arsenic which she had in her possession. It has been suggested that the microscope might possibly have been the means of detecting the particles of colouring natter and identifying the starch granules in the chocolate; but it is easy to suggest what might have been done after the materials are destroyed. Another serious omission was that of the medical attendant, who, during the first attack, allowed the vomited matters to be thrown away without any examination whatever. If these and some other precautions had been taken which were not taken, it is possible that further evidence might have been obtained.

The defects referred to in the professional evidence are mainly attributable to a vicious system introduced within a few years into the method of investigating criminal charges of this nature in the Scotch courts. Formerly the Chemists and the Physicians employed by the Crown to investigate such cases, had placed before them the whole general facts of the evidence in possession of the authorities; and before trial the complete evidence was also laid before them in important cases. But now the Medical and Chemical witnesses, on account of

some late crotchet of the Criminal Court, are studiously kept in profound ignorance of every fact except what they themselves make out. The Crown counsel are consequently compelled to put their questions about the symptoms, morbid appearances, &c., upon a supposed A. B. case, the details of which are collected by themselves, unaided by the witnesses, who are excluded from the Court during the trial. Moreover, the analysts are ignorant, until too late, of any other questions that may arise in the case, except the mere question of poison or not, and what poison. Thus, in the instance of Miss Smith, Dr. Christison and Dr. Penny were simply asked to ascertain whether the materials sent contained arsenic or not. They had not the least idea that any question might arise about colouring matter, until long afterwards, when they were requested to examine certain coloured arsenics from different shops. But by that time all the materials from the dead body had been disposed of. Similar blanks are likely to occur perpetually under the present system above described. Formerly the Chemical witness could foresee the probable contingencies, and provide accordingly. From a detailed report in the *Scotsman* newspaper, which has been republished in the form of a pamphlet, it appears (page 54) that Professor Christison had not even seen the reports of the Medical men who attended the deceased and conducted the *post-mortem* examination.

We are informed that a similar custom prevails in the Criminal Courts in Holland, and that this is carried to such an extent, that no information is given to the Chemical witness even as to the nature of the poison suspected. He is simply furnished with the materials for examination, and required to ascertain whether poison of any kind is present or not.

In the newspaper reports an error occurs in the evidence of Professor Christison, who is represented as stating that water which had been boiled would dissolve about a thirty-second part of arsenic. The statement was to the effect that water in which arsenic had been boiled would, after cooling, retain in solution about a thirty-second part. Dr. Christison does not appear to attach much importance to the difficulty of mixing and administering so large a dose of arsenic as the quantity supposed to have been swallowed by the deceased, but finds it difficult to account for so large a quantity having been found in the stomach, after the repeated vomiting which is represented to have occurred in L'Angelier's case. How the arsenic found its way into the stomach of the deceased, and whether administered by another person or swallowed with a suicidal intention, is, and must continue to be (in the absence of positive evidence), a matter for conjecture, on which opinions may possibly differ. We have been informed that the published reports convey an imperfect idea of the predicament to which the prisoner was reduced, and the consequent urgency of the motive to extricate herself at all hazards from the power of her discarded lover. This, we are told, is shown in the voluminous and extraordinary correspondence, of which the most prejudicial portions were suppressed, as being unfit for publication. In our very much condensed report of the case we have not attempted to give a detailed account of these circumstances, and others of a similar nature, affecting the probability of the guilt or innocence of the prisoner. It was our object to dwell upon the professional evidence, the completeness of which is necessary to ensure conviction in any case of this nature.

Whether innocent or not, Madeleine Smith has had a narrow escape, and the purpose to be answered by noting the omissions or the defects in the chain of evidence, is the more effectual investigation of the next case, for which we ought to be prepared. So notorious an example is not likely to escape imitation, and as Palmer was followed by Dove, we may expect that Madeleine Smith will not be long without a follower.

TRANSACTIONS

OF

THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *July* 1*st*,

Present Messrs. Bell, Bird, Brew, Bucklee, Davenport, Deane, J. B. Edwards, Meggeson, Moore, Keeling, Peacock, Sandford, Squire, and Waugh, the following were elected

MEMBERS.

Burgh.....Lemon, Henry	Mauritius.....De Valancé, C. P.
Derby.....Medley, William	Rugby.....Watson, Walker

MAJOR EXAMINATION, *July* 21.

Cornell, William .....Ipswich
Cutting, James.....Stowmarket
Gill, Hugh ..... Selby
Johnson, Joseph.....London
Judd, William .....Brighton
Williams, Henry Levi.....Newport, Mon.

MINOR EXAMINATION.

Jones, Peter Cooke.....London
Michell, Frederic.....St. Austell
Roberts, Peter.....Mold

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	TOWNS.
Barlow, John Podmore	Mr. William Barlow	Manchester
Blackman, Thomas	Mr. Bishop	Woolwich
Carr, Micklam William	Messrs. Ritson & Sons	Sunderland
Doughty, Thomas Edward	Mr. Doughty	Knightsbridge
Savage, William Wallace	Mr. Savage	Brighton
Taylor, George Spratt	Mr. Coupland	High Harrogate
Watson, Thomas Donald	Messrs. Martindale & Son	Carlisle
Webber, Charles Farrant	Mr. Edwards	Sidmouth
Wigginton, Joseph	Mr. White	Nottingham

REGULATIONS OF THE BOARD OF EXAMINERS,

ADOPTED AND CONFIRMED BY THE COUNCIL,

For the Examination and Registration of Pharmaceutical Chemists, Assistants, and Apprentices or Students.

THE BOARD OF EXAMINERS IN LONDON.

The regular days of meeting for conducting the Major and Minor Examinations, and for the Examination of Apprentices or Students, are the third Tuesday in each month throughout the year, at eleven o'clock in the morning, except in May and September.

Candidates intending to present themselves for the Examination as above are required to send a written notice to the Secretary, on or before the second Tuesday of the month, to allow time for the needful arrangements.

THE BOARD OF EXAMINERS IN EDINBURGH

Meets four times in the year, or as often as occasion may require, due notice of the days of meeting being given in the Transactions of the Society.

APPRENTICES OR STUDENTS

Residing, or about to reside, within ten miles of London or Edinburgh, are required

to present themselves for the Classical Examination at the respective Boards; beyond such distance, they are at liberty to undergo the Examination by any clergyman, minister, or schoolmaster *not having been the teacher of the candidate*, or any Physician or Surgeon, or other persons approved by the Council, whose certificate, if satisfactory, will be received by the Board.

Apprentices or Students intending to present themselves at the Board in London or Edinburgh, are required to give a written notice to the Secretary, on or before the second Tuesday of the month; and forms of the certificate for the country may be had on application to the Secretary, which, when filled up, must be returned; and if approved by the Board, on the payment of the fee of two guineas, the Apprentice or Student will be registered, and will be entitled to enjoy the privileges of the Society during the period of indenture, or until the age of twenty-one.

THE CLASSICAL EXAMINATION.

Registration Fee—Two Guineas.

The object of this Examination is to ascertain whether the candidate possess that elementary knowledge which is essential as the ground-work of the education of a Pharmaceutical Chemist.

The Examination will be conducted in the Latin grammar, and some elementary work in that language, or the Latin Pharmacopœia; and in the simple rules of arithmetic.

THE MINOR EXAMINATION.

The fee for the Minor Examination and Registration as an Assistant is five guineas; or three guineas if previously registered as an Apprentice or Student. To be deposited with the Secretary before entering upon Examination.

All persons who shall pass the Minor Examination will be registered as Assistants under the provisions of the 15th and 16th Victoria, cap. 56, and be elected to the privileges of Associates of the Society.

This Examination comprises, besides the Latin language, Pharmaceutical and General Chemistry, the Chemistry of Poisons, Materia Medica, the Natural History of Drugs and Botany, and it must be passed by all candidates before being registered as Assistants or admitted Associates of the Pharmaceutical Society.

In the first place, the candidate is required to read and translate several Latin prescriptions, giving the terminations of the words, with a literal and explicit interpretation of the directions. He must prove, by the facility with which he performs this elementary exercise, that he is familiar with the technical terms and the vocabulary of the Latin language, and consequently, competent to take the first step in preparing prescriptions—namely, to read them.

The next subject of Examination is the Materia Medica. On the table are placed barks, roots, gums, fruits, seeds, leaves, resins, &c., none of which are labelled; and the candidate is expected to select from among them any specimen which may be called for, and to state the name of any which may be pointed out. He is questioned as to its nature and properties, the part of the world whence it is procured, the source from which it is derived, and any other particulars which are important in its natural history and application to Pharmacy. The metals, earths, alkalies, acids, salts, and other substances used in medicine, are included in this part of the Examination.

In Botany, a candidate will be expected to possess a general knowledge of the structure and distinctive characters of the different organs of Flowering Plants, and to recognize the medical plants in daily use when placed before him.

The Questions in Chemistry relate to the composition of the various substances enumerated in the Pharmacopœia; the decompositions which occur in the manufacture of chemical compounds, and also in the routine of dispensing business; the leading tests for some of the most powerful poisons, and the modes of detecting ordinary impurities. An acquaintance with the weights and measures, the mode of taking specific gravities, the rules for determining thermometrical equivalents, as well as a ready knowledge of Decimal and Fractional Arithmetic, is also essential.

If a candidate on examination be rejected, he shall not be admissible for re-examination for a period of three calendar months, and the fee shall be returned to him, with the deduction of one guinea for each examination in which he is rejected;

but he shall be afterwards admissible to the Minor Examination on the repayment of the balance so returned.

Candidates are cautioned against the neglect of any subject here named, as a knowledge on each is deemed essential.

THE MAJOR EXAMINATION.

The fee for the Major Examination, and registration as a Pharmaceutical Chemist, is ten guineas; or five guineas if previously registered as an Assistant. To be deposited with the Secretary before entering upon Examination.

No person shall be admitted to the Major Examination until he shall have attained the age of twenty-one years.

No candidate will be admitted to the above Examination until a period of three calendar months after he has passed the Minor Examination, unless special circumstances be shown which, in the opinion of the Board, justify a departure from this general rule.

This Examination is to be passed by candidates for registration as Pharmaceutical Chemists, and it comprises all the above subjects, as well as a more minute acquaintance with the tests and antidotes for ordinary poisons. The Examination in botany will comprise a sound knowledge of the elementary structure of plants and their various organs, together with a general knowledge of physiological botany, and a good practical acquaintance with the natural orders, as printed in the annexed scheme for botanical Examination. The candidate will be expected to recognize the Medical plants in common use, to refer each to its particular order, and to answer any question that may be put to him which has reference to their structure, peculiarities, properties, &c.

If a candidate on Examination be rejected, he shall not be eligible for re-examination for a period of three calendar months, and the deposited fee shall be returned to him, with the deduction of one guinea on each Examination at which he is rejected; but he shall be afterwards admissible to the Major Examination on the repayment of the balance so returned.

MAJOR BOTANICAL EXAMINATION.

STRUCTURAL AND PHYSIOLOGICAL BOTANY.

The candidate will be expected to exhibit a general acquaintance with the structure and functions of the different organs of flowering plants.

N.B.—His knowledge will be tested by written and viva-voce examinations.

SYSTEMATIC BOTANY.

Diagnoses of the following natural orders and genera of plants :—

CLASS I.

EXOGENÆ v. DICOTYLEDONES.

Subclass 1.—Thalamifloræ.

*Ranunculaceæ. Ranunculus—Aconitum — Delphinium — Helleborus — Clematis.

*Papaveraceæ. Papaver—Chelidonium

*Cruciferæ. Cardamine — Brassica—Cheiranthus—Lepidium —Raphanus —Sinapis — Crambe — Cochlearia — Isatis.

Polygalaceæ. Polygala—Krameria.

Caryophyllaceæ. Dianthus—Alsine.

Linaceæ. Linum.

*Malvaceæ. Malva—Althæa—Gossypium.

Tiliaceæ. Tilia.

Geraniaceæ. Geranium—Pelargonium.

Hypericaceæ. Hypericum.

Aurantiaceæ. Citrus.

Rutaceæ. Ruta.

Subclass 2.—Calycifloræ.

Rhamnaceæ. Rhamnus.

*Leguminosæ or Fabaceæ. Acacia—Cassia—Astragalus—Mimosa — Cytisus — Ulex — Trifolium — Onobrychis—Vicia.

*Rosaceæ. Amygdalus — Potentilla—Rubus—Rosa—Prunus—Pyrus.

Myrtaceæ. Myrtus—Eugenia.

*Cucurbitaceæ. Bryonia—Cucumis—Momordica.

*Umbelliferæ or Apiaceæ. Daucus —Pastinaca—Apium—Fœniculum—Petroselinum — Archangelica — Carum—Anethum —Pimpinella—Coriandrum — Conium — Œnanthe — Æthusa—Cicuta.

Subclass 3.—Corollifloræ.

Caprifoliaceæ. Sambucus — Viburnum.

*Rubiaceæ. Rubia—Galium.

Valerianaceæ. Valeriana—Centranthus.
*Compositæ or Asteraceæ. Pyrethrum—Anthemis—Cnicus—Centaurea—Tussilago—Inula—Artemisia—Leontodon—Cichorium—Lactuca.
Lobeliaceæ. Lobelia.
*Gentianaceæ. Gentiana—Erythræa—Menyanthes.
*Solanaceæ. Hyoscyamus—Nicotiana—Datura—Atropa—Solanum.
*Scrophulariaceæ. Verbascum—Digitalis.
*Boraginaceæ. Symphytum—Borago—Anchusa.
*Labiatæ. Mentha—Salvia—Origanum—Lavandula—Melissa—Marrubium.
Oleaceæ. Olea—Fraxinus—Ligustrum.
*Convolvulaceæ. Convolvulus—Cuscuta.

Subclass 4.—Monochlamydeæ.

*Polygonaceæ. Polygonum — Rumex—Rheum.
*Euphorbiaceæ. Euphorbia — Mercurialis—Ricinus.
Aristolochiaceæ. Aristolochia—Asarum.
Urticaceæ. Cannabis — Humulus — Parietaria.
Amentaceæ. Salix—Quercus.
Coniferæ. Pinus—Abies—Juniperus.

CLASS II.
ENDOGENÆ v. MONOCOTYLEDONES.

Subclass 1.—Dictyogenæ.

Smilaceæ. Smilax.
Dioscoreaceæ. Dioscorea—Tamus.

Subclass 2.—Petaloideæ.

Orchidaceæ. Orchis—Vanilla.
*Iridaceæ. Iris—Crocus.
Amaryllidaceæ. Narcissus—Agave.
*Liliaceæ. Aloe—Allium—Scilla,
*Melanthaceæ. Colchicum—Veratrum
Palmaceæ. Sagus—Areca—Cocos.
Araceæ. Acorus—Arum.

Subclass 3.—Glumaceæ.

*Graminaceæ. Secale — Triticum — Hordeum — Avena — Oryza — Zea — Saccharum—Anthoxanthum.

CLASS III.
CRYPTOGAMIA v. ACOTYLEDONES.

Subclass 1.-Acrogenæ or Cormogonæ.

*Filices. Aspidium—Pteris.

Subclass 2.—Thallogenæ or Cellulares.

Lichenes. Cetraria—Roccella.
Fungi. Ergota—Agaricus—Tuber.
Algæ. Fucus—Chondrus.

Note.—The Student will be required to describe in detail the natural orders marked above with an asterisk ; he will also be expected to have a general idea of the other natural orders and genera.

ORIGINAL AND EXTRACTED ARTICLES.

ON A METHOD OF OBTAINING GLUE FROM CERTAIN KINDS OF LEATHER.

BY JOHN STENHOUSE, L.L.D., F.R.S.

When the thinner kinds of ordinary leather, such as are used to form the upper portions of boots and shoes, and for similar purposes, are reduced to fine shreds, and then boiled in a Papin's digester, at a pressure of about two atmospheres, for three hours, with 20 per cent. of powdered chalk, or 15 per cent. of hydrate of lime, and a considerable quantity of water, the leather is almost entirely decomposed; its tannic acid combining with the lime forms an insoluble precipitate, and the gelatine dissolving in the water forms a pretty concentrated solution, which on evaporation yields an excellent glue.

The glue obtained by this process amounts to about 25 per cent., but varying considerably; sometimes as much as 36 per cent. has deen obtained, at other times as little as 15 per cent., operating, of course, on different parcels of leather ; the reason of these variations will speedily be apparent.

It was naturally to have been expected that the thicker kinds of leather, such as those employed for the soles of shoes and similar purposes, would, when digested with chalk under pressure, have undergone a similar decomposition; this, however, was found not to be the case, as this species of leather, however minutely divided, yielded little more than traces of glue, and this was the case even when caustic baryta was employed. It is evident, therefore, that the thicker kinds of leather have a very different constitution from that of the lighter varieties, and are in fact different substances. This diversity in constitution probably arises from changes which the thick leather undergoes in the

tan-pit, where it is usually kept from six to eighteen months, while the tanning of the thinner kinds of leather is usually completed in a few weeks. This singular metamorphosis, which the thick leather undergoes during the long-continued maceration with tannin to which it is subjected, explains the reason why the numerous attempts which have been made to shorten the length of the tanning process for thick leather have all been unsuccessful, the quality of the leather, as is well known, being deteriorated exactly in proportion as the tanning process was shortened; the leather produced by these quick processes being of a uniformly soft and spongy character, long-continued exposure in the tan-pit being essential to the formation of the altered, dense variety of leather. Even the lighter varieties of leather, which have been quickly tanned, when long kept, say for ten or twelve years, appear to undergo a similar modification, so that when digested under pressure with lime, they yield but very small quantities of glue. This alteration appears to take place more rapidly when the leather is exposed to air and moisture; the leather, under these circumstances, loses much of its flexibility; hence the quantity of glue obtained from old boots and shoes is very inconsiderable.

As I thought it not improbable that the animal portion of the leather might have undergone decomposition by losing a portion of its nitrogen, various kinds of leather were subjected to ultimate analysis, but, as will be seen from the subjoined results, the leather appeared to have merely undergone a metamorphosis by a new arrangement of its molecules without any of its nitrogen being eliminated.

New Thick— I. 0.185 gramme gave 0.346 CO_2, 0.099 HO, and 0.002 ash
0.152 do. do. 0.102 Pt.
II. 0.255 do. do. 0.475 CO_2, 0.130 HO, and 0.0025 ash

New Thin— I. 0.056 gramme gave 0.098 CO_2, 0.028 HO, and 0.0015 ash
0.012 do. do. 0.059 Pt.
II. 0.075 do. do. 0.132 CO_2, 0.035 HO, and 0.002 ash
0.198 do. do. 0.113 Pt.

Old Thin— I. 0 115 gramme gave 0.21 CO_2, 0.06 HO, and 0.002 ash
0.241 do. do. 0.154 Pt.
II. 0.1725 do. do. 0.315 CO_2, 0.085 HO, and 0.0025 ash
0.195 do. do. 0.123 Pt.

	NEW THICK.			NEW THIN.			OLD THIN.		
	I.	II.	Mean.	I.	II.	Mean.	I.	II.	Mean.
Carbon	50.81	50.58		46.67	48.00		49.73	49.79	
Hydrogen ...	5.94	5.64		5.53	5.17		5.21	5.15	
Oxygen.....									
Nitrogen	9.52	9.21		8.25	8.12		9.12	9.00	
Ash	1.08	1.00		2.67	2.66		1.73	1.75	

Though the decomposition of leather under pressure by lime is no doubt interesting in a scientific point of view, I fear it is not likely to be an economical process, as even the thinner kinds of leather have a considerable value, being worth about twopence per pound.

In conclusion, I may remark, that the only practical improvement of importance which has been made upon the process of tanning for many years, is that which is technically called "handling" the hides. This consists in frequently withdrawing the hides from the tan-pit, and allowing them to get partially dried; in this way the exhausted solutions of tan are in a great measure withdrawn from the hides, and on their re-immersion in the tan-pit, the tanning proceeds with increased rapidity. The effect of these operations through the influence of air and moisture, probably greatly facilitates the production of the denser variety of leather.

DR. FELL'S REMEDIES FOR CANCER.

The terms and conditions of the bequest under which the cancer ward of Middlesex Hospital was founded, stipulate that facilities are to be afforded for giving a fair trial to any new remedy or improved method of treatment, from which there may be reason to anticipate a mitigation of the sufferings of patients affected with cancer. In accordance with this benevolent design of the testator, an official communication was made in the month of January to Dr. Fell by the Secretary of the hospital on behalf of the Committee, inquiring on what terms and conditions he would consent to place at the disposal of the medical officers the opportunity of trying his remedy, the reputation of which had become known, although its precise nature had not yet been published.

Dr. Fell, in reply, proposed that twenty-five patients should be selected by the medical officers and himself (fair cases), and that he should be permitted to undertake and conduct the treatment of these cases for a period not exceeding eight months, no persons except the medical staff of the hospital being allowed to visit the patients thus placed under his care, or to interfere in any way with the treatment. Dr. Fell undertook to disclose the entire details and particulars of his remedies to the medical staff of the hospital, but he claimed the privilege of doing so *in confidence*, pending the completion of his work, which was at that time in course of preparation for the press, and in which he intended to give a complete account of his method of treating the disease, with the result of his experience.

The authorities of the hospital having assented to the conditions, Dr. Fell commenced his treatment on the 22nd of January, and on the 18th of March he obtained a report, signed by the four surgeons of the hospital, of which the following is an extract:—

"The undersigned have great pleasure in now stating that Dr. Fell has fulfilled the obligation contracted by him frankly and without reserve; and whilst they regret that the limited period which has elapsed since the treatment in the hospital was commenced (Jan. 22) prevents their coming to any positive conclusion upon certain points of great importance, they have yet no hesitation in stating their unanimous opinion:—1. That Dr. Fell's mode of treatment is in entire accordance with known principles of surgery: is ingenious, safe, and easy of application by well-instructed Surgeons. 2. That it may be employed in all cases in which Surgeons use the knife, and in many others in which no prudent person would recommend a cutting operation. 3. That Dr. Fell confines himself to the enucleation of the tumours merely; and in the case of the breast does not remove the entire gland, as is commonly considered necessary in the excision of mammary cancers in this country. 4. That it is a great advantage attending this mode of treatment that the patients are not confined to bed or to the house, but are able to obtain the benefit of exercise in the open air."

The Report proceeds to notice some other advantages of a technical nature, with the important one of causing less pain than the remedial measures usually employed; and concludes with the remark, "that the undersigned have not as yet had time to ascertain the average duration of the benefit conferred by the treatment, nor have they any means of knowing whether, in the event of a return of the disease, there be any difference observable from what is known to take place after excision."

Dr. Fell, in his *Treatise on Cancer and its Treatment*, which has now placed the profession and the public in possession of all the information he has to give, states that early in the course of his researches it occurred to him that it would be necessary to find some agent exerting a specific effect upon cancerous matter, acting by absorption, and destroying the tendency to recurrence. He tried many remedial agents in vain, and his efforts were unsuccessful until he heard of a root used by the North American Indians, on the shores of Lake Superior, which the Indian traders told him was used with success in these affections. It is called by the Indians "puccoon," and is the *Sanguinaria*

Canadensis of botanists. Speaking of this plant, Dr. Fell says:—"It grows in great abundance in the wild forests and plains of the far west; indeed, in early spring, the ground in many parts is covered by its large white blossoms. Such a plant, with showy snow-white flowers, would naturally soon attract the attention of the savage; but when he found that whenever this plant was injured, or a leaf-stalk broken, it exuded a copious stream of a blood-like fluid, he immediately considered it as sacred and a great medicine. And no doubt some poor squaw, suffering from this dreadful disease, was the first who applied it, after having tried all the simple herbarium of the uneducated savage without success, and then, in despair, applied the bruised bloody pulp of the white flowering puccoon."—P. 57. It has been given internally as an alterative and emmenagogue. See Wood and Bache (*United States Dispensatory*).

Dr. Fell's first experiments with puccoon were upon ulcerative surfaces, and although requiring months of continued application, yet (he states) the removal of the tumour was effected, and the patient cured. It was then combined with various substances, with a view to hasten its action; but none appeared to answer so well as the chloride of zinc, for with this compound large ulcerated tumours were removed in a few weeks with comparatively little, and in many cases no pain, at the same time obtaining by absorption and by the internal use all the good effects of the puccoon.

"The compound generally used is prepared according to the following formula:—

"℞ Sanguinariæ Canadensis, ℥ss. vel ℥j.
Chlor. Zinci, ℥ss. vel ℥ij.
Aquæ, ℥ij.
Pulv. sem. Tritic. Hibern., q. s.

"Mix, and form a paste the consistence of treacle."—P. 59."

Dr. Fell destroys the skin in the first instance by nitric acid, and subsequently scores the eschar with a knife. The proportions of the sanguinaria and the zinc are varied according to the effect. The paste is spread on strips of cotton, cloth, or wool, and inserted daily into the incisions.

Dr. Fell also employs an ointment, distinguished by the name of "the brown ointment:"—

"℞ Sulph. Zinci, ℥vj.
Sanguinariæ, ℥ij.
Myricæ Ceriferæ, ℥j.
Extr. Opii (aquos)
Extr. Conii, āā ℥vj.
Ung. Cetacei, ℥vj. ℔"

In conjunction with the above, and applied alternately each for twelve hours, Dr. Fell sometimes uses an iodide of lead ointment:—

"℞ Iod. Plumbi, ℈j.
Glycerine, ℥j.
Ung. Cetacei, ℥ij. ℔"

This external treatment is accompanied by the internal administration of half-grain doses of the puccoon three times daily, either alone or with one-sixteenth or one-twentieth of a grain of iodide of arsenic and a grain of extract of hemlock in a pill; or if given in decoction, the fluid extract of taraxacum is generally combined with it. The real value of the puccoon may be considered as scarcely proved, since, according to Dr. Fell's account of it, when used alone, the action, if any, is very slow, while, by the aid of chloride of zinc, a rapid and effectual impression is made upon the disease.

Chloride of zinc was employed by Hanke of Breslau and Canquoin of Paris, in the treatment of cancer, upwards of twenty years back. The attention of the profession in this country was specially directed to its use by Mr. Ure, Surgeon to St. Mary's Hospital, by a series of researches on its therapeutic action, illustrated with cases, published in the volumes of the *London Medical Gazette* for

the years 1836 and 1837. Mr. Ure recommended it to be applied in the form of a paste, combined with sulphate of lime. He had recourse to its employment in subcutaneous and cutaneous cancers; in carcinomatous ulceration, frequently termed *noli me tangere;* and in various forms of malignant ulceration, independent of scirrhus. The following is a quotation from one of Mr. Ure's papers:—

"The superiority of this phagedenic paste (for so the preparation may be justly named) over every other caustic, consists in its susceptibility of being applied over very extensive surfaces without any risk of injury from absorption, and in its being available wherever the surgeon's hand can reach. The depth to which it will corrode the morbid texture can always be ascertained beforehand; its action is unfailing; the separation of the eschar is prompt; and it imparts an excellent character to the sore, and soundness to the suppuration. The favourable modification of the tissues with which cicatrization follows, and the mildness of the general phenomena that accompany its action, are additional recommendations."—*Medical Gazette*, vol. vii., page 329.

Chloride of zinc was also used successfully by the late Mr. Liston in a manner somewhat similar to that above described, and it has for some years been in frequent use as a caustic. It requires, however, much care in its application; and it is sometimes found to occasion very severe pain.

The amount of credit due to Dr. Fell for originality in his treatment of cancer is not easily estimated; and so far as the nature of the remedies is concerned, the only novelty appears to consist in the use of the puccoon, which is not a very important ingredient. The medical journals are not very flattering in their verdict; and it is probable that some prejudice may exist, from the fact that Dr. Fell is stated to have practised his remedy for his own benefit during twelve or eighteen months before he divulged his secret to the profession. We believe, however, that the impression made by him on the medical staff of the Middlesex Hospital, by the exposition of his method in that institution, was favourable; and we are informed that several of the patients who were placed under his care left the hospital satisfactorily and expeditiously cured.

REPORT OF THE
RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,
AND OF THE
APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

BY B. H. PAUL, Ph.D.

(*Continued from p.* 32.)

Examination of Milk.—Prof. Otto* has during last November, December, and January, examined several sorts of cows' milk, with the view of ascertaining whether the density furnishes any trustworthy indication of the goodness of milk. In each instance the amount of solid substance in the milk was estimated by evaporation to dryness, and the milk operated upon was obtained from neighbouring farms, and from cows that had calved recently and a longer time. His results were as follow:—

	Density.	Lactometer degrees.	Amount of dry substance.
Morning milk	1.0310	16	12.3
	1.0322	17	12.1
	1.0326	17	12.2
Evening milk	1.0330	17	12.7
	1.0326	17	12.5
	1.0326	17	12.4

* *Annalen der Chemie und Pharmacie*, cii., 57.

	Density.	Lactometer degrees.	Amount of dry substance.
Morning milk	1.0322	17	11.8
	1.0314	16.5	11.8
	1.0322	17	12.1
Evening milk	1.0318	16.5	12.2
	1.0322	17	12.2
Morning milk	1.0326	17	12.2
	1.0326	17	11.3
Morning milk — From cows that had recently calved	1.0334	17.5	11.5
	1.0330	17	11.7
	1.0326	17	11.5
Morning milk — From cows that had calved a longer time	1.0318	16.5	11.9
	1.0310	16.0	11.6
	1.0310	16.0	11.5
Skimmed milk	1.0343	18.0	11.1
	1.0355	18.7	—
	1.0338	17.7	11.0
	1.0347	18.0	10.7
Very rich milk	1.0261	14.0	16.8
Diluted (?) milk	1.0216	11.5	7.9
	1.0228	12.6	9.1
	1.0257	13.5	9.5

The second row of figures gives the degrees of Dörffel's lactometer, corresponding to each sample of milk. This instrument is a small hydrometer, with a scale about two inches long, divided into twenty degrees, the zero being placed at the point to which the instrument sinks in water, and the twentieth degree corresponding with the density 1.0383.

The above table of results shows that ordinary unadulterated milk ought to indicate 17° of this hydrometer. This has been decided upon by the Berlin authorities as the average indication. The first sample of milk, indicating 16°, Prof. Otto considers an unusually rich milk. It will be seen also from this table that the estimation of the amount of dry substance, together with the density, admits of a safe inference as to the relative amount of the constituents of the milk: the casein, sugar, and salts on the one hand, and the butter on the other; so that, in most cases, a special estimation of the amount of butter is not necessary.

The milk of cows that have recently calved has always a rather less density than that of cows which have calved some time, but the amount of dry substance is much the same in both, showing that the former is richer in butter than the latter. As a general rule, a large amount of dry substance, with low density, indicates a large per-centage of butter; a small amount of dry substance, with high density, indicates a low per-centage of butter; and low density, with a small amount of dry substance, indicates dilution with water.

Prof. Otto is of opinion that milk which does not correspond to at least 14° of Dörffel's lactometer, may be regarded as diluted with water.

Detection of Picric Acid.—Prof. Otto* states that a water solution of picric acid, containing $\frac{1}{1,000,000}$, or 0.001 grm. in a liter, has a distinct yellow colour. A solution as dilute as this does not taste bitter. The taste does not become perceptible when it contains less than $\frac{5}{1,000,000}$. The detection of this acid depends upon its character of giving colour to woollen yarn. When a piece of clean, white woollen yarn, an inch long, is immersed in the solution containing $\frac{1}{1,000,000}$ of the acid, it does not become coloured within twenty-four hours; but when a few drops of dilute sulphuric acid are added, it very soon becomes coloured yellow. In this way picric acid may be detected in beer, containing only $\frac{1}{400,000}$ part. It is not necessary in this case to add sulphuric acid, as the beer itself generally contains sufficient acid for fixing the colour.

Pure beer communicates to woollen yarn a brownish-grey tinge; but this colour is very different from that produced by picric acid. It is not advisable to warm the beer with the woollen yarn, because then the colour, owing to the beer, is more

* *Annalen der Chemie und Pharmacie*, cii., 67.

strongly marked. Nor is there any advantage gained by immersing the coloured yarn in chloride of tin and then in dilute solution of soda, because the slight undecided colour produced by pure beer, is rendered pure yellow by means of chloride of tin.

When wool, dyed with picric acid, is warmed with lime water, and a few drops of protochloride of tin solution are then added, a reddish precipitate is produced.

Modification of the Silver Assay.—Alloys not unfrequently occur, which contain, besides silver and gold, a certain amount of tin. When treated with nitric acid, they give a solution which contains finely divided Cassius purple suspended; and the accurate estimation of the amount of silver is thereby rendered very difficult. The presence of small quantities of sulphur likewise hinders the accurate estimation of silver. For this reason, M. Levol* recommends the use of concentrated sulphuric acid for dissolving alloys containing gold and silver. In other respects the assay is made in the same way as when nitric acid is used for dissolving the alloy.

Preparation of Ink.—Dr. Bley† recommends the following method of preparing ink:—A decoction is made with a pound and a quarter of nut-galls, and as much hot water as will give five pounds of liquid after straining. Then four ounces of indigo powder is mixed with half a pound of sulphuric acid, the mixture left for twenty-four hours, then dissolved in five pounds of water and eight ounces of powdered chalk, and eight ounces of iron filings added. A part of the acid is neutralized by the chalk, and a part by the iron filings, forming sulphate of iron. The solution thus obtained, mixed with the decoction of nut-galls, gives ten pounds of ink, which does not deposit sediment or turn mouldy, and flows readily from the pen.

Estimation of Acetic Acid in Vinegar.—Mr. Nicholson and Dr. Price have stated that the estimation of acetic acid, by means of carbonate of soda or caustic alkalies, gives results that are not accurate, because the acetate of soda has an alkaline reaction. Prof. Otto‡ has recently made some experiments, with the view of ascertaining whether the error thus caused is constant, or whether it is sufficiently small to be disregarded; and has obtained results very different from the above-named chemists. The following numbers represent the per-centage of acetic acid in vinegar, as estimated by different methods:—

Acetometer.	Carbonate of soda.	Carbonate of baryta.
6.3	6.5	6.2
9.1	9.2	9.0

For testing with carbonate of soda, a solution was prepared, containing 104 grm. in a liter. 5 cub. cent. of this solution indicated in 50 grm. of vinegar one per cent. of anhydrous acetic acid. The point of saturation was determined by means of pale blue litmus paper.

For testing with carbonate of baryta, a weighed quantity was digested with a weighed quantity of vinegar, with the aid of heat, until the liquid acquired an alkaline reaction. The undissolved carbonate of baryta was collected upon a filter, washed, dried, ignited, and weighed.

In order to remove the objection that the digestion with carbonate of baryta had not been continued long enough, the following experiment was made:—A solution was prepared, containing in 100 grm. 27 grm. of crystallized acetate of soda. This solution contained 10 grm. or 10 per cent. of acetic acid. It had an alkaline reaction upon reddened litmus paper. When mixed with 2 cub. cent. of vinegar, containing 4.5 per cent. acetic acid, it became perfectly neutral, and another cubic centimeter of vinegar was sufficient to make it have a decided acid reaction upon blue litmus paper. The quantity of acetic acid in 2 cub. cent. of vinegar, containing 4.5 per cent. of acetic acid, is not quite 0.1 grm.; so that the error incurred by estimating the amount of acid in vinegar, containing 10 per cent. acetic acid, by means of carbonate of soda, would be only $\frac{1}{10}$ per cent. at the utmost, and is certainly much less, because in practice there is always a little excess of soda added.

A hot solution, containing 50 per cent. of acetate of soda, corresponding to 18.7 per cent. acetic acid, was rendered neutral by 2 cub. cent. of vinegar, containing 9 per cent. of acetic acid, and distinctly acid by 1 cub. cent. more vinegar.

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* *Annal. de Chim. et de Phys.*, Ser. 3, xliv., 347. † *Archiv. der Pharmacie*, cxl., 213.
‡ *Annalen der Chemie und Pharmacie*, cii., 69.

Prof. Otto infers from these results that the estimation of the amount of acid in vinegar, by means of carbonated or caustic alkalies, may be adopted without the risk of any sensible error, inasmuch as the alkaline reaction of the alkaline acetates do not affect the results to such an extent as need be regarded in practice.

He also remarks that a comparison of the relation between the density of ammonia solution and the amount of ammonia contained in it, as estimated by him some years since, with the results obtained recently by Carius in a very different manner, shows a very close correspondence.

Test for Ammonia.—Dr. Nessler* has examined the reaction that takes place between iodide of mercury and ammonia, and finds that it may be taken advantage of for the detection of ammonia.

The solution of iodide of mercury in iodide of potassium has long been used as a test for alkaloids. They give with this reagent, even in very dilute solutions, a slightly coloured precipitate.

The fixed alkalies do not give any precipitate, and ammonia gives a crystalline precipitate only when the solution is very concentrated.

However, when the iodide of mercury solution is mixed with free potash, even very minute traces of ammonia or of ammoniacal salts produce a precipitate, which has the composition $Hg_4\,NI + 2\,HO$. When the quantity of ammoniacal salt is greater than the free potash is capable of decomposing, this precipitate is not produced or is again dissolved, and is precipitated again, by the addition of more potash. Iodide of potassium has the same influence. It dissolves the precipitate more readily the smaller the amount of free potash there is present. When free potash is present in large excess, none of the precipitate is dissolved by iodide of potassium.

In order to prepare a solution of iodide of mercury with the proper proportion of iodide of potassium, 20 grm. of iodide of potassium are dissolved in 50 cub. cent. of water, and iodide of mercury added until no more is dissolved. About 32.21 grm. will be dissolved. According to the formula HgI KI, 20 grm. of iodide of potassium would require 27.3 grm. of iodide of mercury ; so that iodide of potassium solution dissolves rather more than an equivalent of iodide of mercury. This solution is diluted to 200 cub. cent. with water, and mixed with 30 cub. cent. of concentrated solution of potash. In this state it is to be preserved as a test for ammonia.

In order to test the delicacy of this reagent, 1 cub. cent. of ammonia solution, containing 0.01 grm. of ammonia, was diluted to 10,000 cub. cent. A single drop of this liquid, containing at the utmost 0.0000005 grm., was sufficient to give a yellow colour with the reagent ; and on warming the mixture, a distinct precipitate was produced. A solution of chloride of ammonium, containing in 1 cub. cent. only 0.000003, produced the same reaction. By means of this reagent, ammonia could easily be detected in rain water collected in an open vessel. This extreme delicacy is readily accounted for by the composition of the precipitate, 17 parts of ammonia being sufficient to produce 559 parts of the precipitate ; the reaction which takes place in its formation being represented by the following equation :—

$$4\,(HgI,\,KI) + 3\,KO + NH_3 = (Hg_4\,NI + 2\,HO) + 7\,KI + HO.$$

Alkaline chlorides and compounds of the alkaloids, with oxygen acids, do not interfere with the reaction ; and iodide of potassium does so only when there is not a sufficient proportion of free potash present.

In the presence of cyanide of potassium or sulphide of potassium, the reaction does not take place even in concentrated solutions of ammonia, or when a large excess of potash is present.

Urea does not produce the reaction in the cold, but does so—owing to decomposition—when the solution is heated. Ammonia cannot therefore be tested for in urine by means of this reagent. Moreover, a dark coloured precipitate is produced, shortly after adding the reagent to urine, independently of the presence of ammonia.

Alkaloids give the same reaction—a whitish precipitate—with this reagent that they give with solution of iodide of mercury in iodide of potassium that does not contain free alkali. It is therefore possible in this way to detect the presence of traces of ammonia, mixed with the volatile alkaloids, conia, nicotia, chinoline, aniline, and æthylamine ; and this fact is the more important, inasmuch as these

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* *Chem. Centralblatt*, 1856, No. 34.

alkaloids are generally associated with ammonia, and they, in common with ammonia, produce white fumes with hydrochloric acid vapour.

The whitish precipitates, produced by the solution of iodide of mercury in iodide of potassium with aniline and æthylamine, dissolve in excess of iodide of potassium, and are again precipitated by caustic potash—the æthylamine precipitate then presenting a fine yellow colour.

The precipitates produced with nicotine, conia, and chinoline, are much less readily dissolved by excess of iodide of potassium, and are not again thrown down by caustic potash.

Asparagin in the Root of Robinia Pseudacacia.—Prof. Hlasiwetz* finds that the root of this plant contains a considerable quantity of asparagin. When boiled with water, the roots give a decoction, which, when evaporated to the consistence of syrup, deposits after some days a considerable quantity of hard, tolerably large octahedral crystals. By recrystallizing twice they become colourless, and appear highly refractive, do not effloresce, and have a slight sweet taste. The solution is neutral, evolves ammonia when mixed with caustic potash, and is not precipitated by acetate of silver or by acetate of lead. Analysis showed that they are asparagin.

This substance appears to occur very frequently in the members of the leguminous tribe. It has already been recognized in peas, beans, vetches, &c.

By simply making a decoction, and evaporating to a syrupy consistence, a very pure substance may be obtained after recrystallizing twice. About thirty pounds of the root yielded upwards of two ounces and a half of asparagin.

Notes on Fermentation.—M. Berthelot† has found that when mannite is exposed, together with chalk and casein (cheese), to a temperature of 104° F., a large quantity of alcohol is produced, while hydrogen and carbonic acid are evolved. Lactic acid is also produced. Almost all the nitrogen of the ferment escapes in the gaseous state. No formation of yeast cells could be detected. All animal tissues and nitrogenous substances produced the same effect as casein.

Dulcin, under the same conditions, gives a large amount of ordinary alcohol.

Sorbin sometimes yielded alcohol, but always lactic acid.

Glycerin yields some alcohol, and M. Berthelot considers this fact proves that there is a great similarity between glycerin, mannite, and the sugars which are directly susceptible of fermentation.

Under the same conditions, cane sugar, starch sugar, milk sugar, gum, starch, and beer yeast were found to yield a certain amount of alcohol, the production of which was not hindered by the presence of some salts or ethereal oils which are considered to prevent fermentation.

In the case of sorbin, milk sugar, and starch, no intermediate products could be detected at any time in the fermenting liquid.

In the alcoholic fermentation of mannite, dulcin, and glycerin, in the presence of carbonate of lime, the production of sugar analogous to glucose, could not be detected. These three substances remain unaltered in contact with animal substances, when the carbonate of lime is not added. It is only in some instances that traces of alcohol are produced. But when a solution of mannite or glycerin is left in contact with fresh membranes, especially those of the testicle and pancreas, sugar similar to glucose is often found in the liquid after some weeks. This sugar is directly fermentable, and precipitates suboxide of copper from the alkaline solution of tartrate of copper. The quantity of sugar is much greater than that of the nitrogenous substance that passes into solution.

Preparation of Sulphocyanide of Potassium in the Wet Way.—Dr. Löwe‡ states that when a solution of ferricyanide of potassium is boiled with an excess of hyposulphite of soda, the reddish-brown colour of the liquid disappears after a while, black sulphide of iron is deposited, together with some sulphur, originating from the decomposition of the hyposulphite by heat. The yellowish liquid which remains contains sulphocyanide and ferrocyanide of potassium, together with sulphate and hyposulphate of soda, and a small quantity of sulphide of sodium. By evaporating to dryness, and digesting the residue with alcohol, the sulphocyanide may be separated from the other salts.

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* *Sitzungs-Bericht der Akad. der Wissens. zu Berlin.* † *Comptes Rendus*, xliii., 238.
‡ *Jahresbericht des Physikalischen Verins zu Frankfort*, 1856.

Tannic Acid of Nut-Galls.—Dr. Rochleder* ascertained some time since that the action of boiling alkaline solutions in an atmosphere of hydrogen is a good means of effecting the separation of certain organic substances. At his instigation, Hr. Kawalier has followed out this fact, and found that many substances which, by the action of dilute acids and heat, are separated into crystallizable sugar and a second substance, yield this sugar also when acted upon by boiling alkaline solutions in hydrogen. Among other substances, tannic acid has been treated in this way, and found to be converted into gallic acid, and an amorphous, rather bitter and acid tasting yellowish substance, similar to gum, and having a composition agreeing with the formula C_{12} H_{11} O_{11}. No trace of sugar was found, even from 150 grammes of tannic acid ; and the liquid from which the gallic acid had been separated did not reduce an alkaline solution of copper.

Bronze Powder.—Hr. König† has made some experiments, with the view of ascertaining the mode of preparing bronze powder, which is generally kept secret. The specimens he examined were those known commercially as—

1. Pale yellow. 2. Yellow. 3. Reddish yellow. 4. Orange. 5. Copper red. 6. Violet. 7. Green. 8. White.

The bronze powders 1, 2, 3, 4, 6, and 7, were found to consist of copper and zinc, with traces of iron. 3, 4, 6, and 7, contained a small amount of oxydized copper, the surface of the particles being covered with suboxide of copper. This is shown by the action of acids ; for when the powder was covered with dilute sulphuric or hydrochloric acid, the colour immediately disappears, owing to the solution of the thin layer of suboxide, and the proper colour of the alloy appears. The amount of oxygen could not be estimated in any of these bronzes, but it did not amount to one-thousandth. The bronze powder called white, contains zinc and tin. The bronzes 3—7 were also found to contain a minute quantity of fat, which, on dissolving the powder in dilute acid, separated upon the surface of the liquid in the form of a thin film.

The quantitative analysis of the alloys gave the following per-centage results :—

	Copper.	Zinc.	Iron.	Tin.	Remarks.
1. Pale yellow.....	82.33	16.69	0.16	—	
2. Yellow	84.50	15.30	0.07	—	Fine golden yellow
3. Reddish yellow	90.00	2.60	0.20	—	Brass yellow, with a shade of red
4. Orange.....	98.93	0.73	0.08	—	The colour of clean copper that has been heated
5. Copper red	99.90	—	trace	—	Copper colour, with a shade of purple
6. Violet	98.22	0.50	0.30	trace	Purple violet
7. Green	84.32	15.02	0.03	trace	Bright bluish-green
8. White	—	2.39	0.56	96.46	Between tin white and lead grey

These results show that bronzes of the most different colours possess nearly the same composition. The action of acid shows likewise that their colour is owing to different degrees of oxydation. It appears therefore probable, that in the preparation of bronze powder, a certain alloy is used for all, and that the colours are produced by heating to different temperatures. This, Hr. König found to be the case. In his experiments with the above-named powders, No. 1, when heated, presented successively all the prismatic colours, and acquired a fine dark violet. Most of the other bronzes presented the same character, and when the heat was maintained, lastly became black, from complete oxydation.

Hr. König is of opinion that the fat in these bronze powders originates from the

* *Sitzungsbericht d. Ak. d. Wissens. zu Wien*, xxii., 558.
† *Journal für praktische Chemie*, lxix., 461.

use of fat in their preparation, for the purpose of ensuring uniform temperatures. Tallow or fat oils would not answer for this purpose, since they would in course of time cause an oxydation of the copper. Wax, and especially paraffine, appear better adapted for this purpose. He states that 0.5 per cent. of either substance, mixed with the bronze powder in a shallow pan, is sufficient.

The mechanical subdivision of the alloy is effected by rolling and hammering, as in the preparation of gold leaf, and then grinding the leaves of metal with water, between stones.

Hr. König has endeavoured to prepare these bronzes in the wet way, by reducing the metal, but has not succeeded in obtaining any satisfactory results. The only substance of this kind which he was able to prepare in the wet way, is that called "iron black," which is used for coating gypsum figures, in order to give an appearance similar to grey cast iron. This consists of very finely divided antimony, precipitated from solution by means of zinc.

Coloured Copper Foil.—Hr. König* states that coloured foils may be prepared by silvering copper foil on one side, and then coating the silvered surface with a solution of gelatine, coloured with some transparent pigment, such as cochineal.

Composition for Galvanoplastic Purposes.—Hr. Piil recommends,† as a good material for making moulds, a mixture of stearic acid and shellac. The stearic acid is melted, the shellac added to it gradually, the whole heated until it takes fire, and allowed to burn until the shellac mixes with the fat, and a drop of the mixture let fall upon a cold metal plate takes black-lead readily when solidified.

Comparative examination of Blistering Flies.—Mr. Warner‡ has estimated the amount of cantharidin in 500 parts of each of the under-named insects :—

Cantharis vesicatoria.....	2.03
Cantharis vittata	1.99
Mylabris cichorii	2.13

He also prepared plaister from each, and found that from mylabris was most active.

Physical Character of Boron.—Prof. Wohler and M. Deville§ have recently been engaged with the study of this elementary substance. They find that in its physical characters it presents a still greater analogy to carbon than silicium does. They have observed three distinct modifications of boron, viz.:—

1. *Crystallized boron.* This substance was obtained transparent, and of a garnet red, or frequently honey yellow colour. They consider the colour to be accidental. The crystals resemble diamond in their lustre and refractive power. The thicker crystals present a metallic appearance—owing, probably, to the extraordinary refractive power.

Crystallized boron scratches corundum with great ease. A polished sapphire rubbed with boron powder was scratched at the surface, and the edges were worn down. A polished diamond, with which the boron crystals were crushed upon a quartz crystal, was slightly scratched at all the points of contact. Consequently boron may be regarded as the hardest of all substances, or at least very near to diamond in this respect.

The crystalline form of boron could not be determined, for, though large crystals were obtained, they were found to consist of regular aggregations of several small crystals. From the behaviour of these crystals in polarized light, it would appear that they do not belong to the regular systems; but this is questionable.

Crystallized boron could not be melted by means of the oxyhydrogen blowpipe. The pulverulent boron obtained by Berzelius' method was melted by Despritz with the galvanic battery.

Crystallized boron resists the action of oxygen, even at high temperatures; it is oxydized at the temperature at which diamond burns, but then there is produced at the surface a layer of boracic acid, which protects it from further oxydation. Chlorine, on the contrary, acts with remarkable energy upon boron; at a red heat it

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* *Journal fur praktische Chemie*, lxix., 466.
† *Polytechn. Notizblatt*, No. 13, p. 193.
‡ Wittstein's *Vierteljahrschrift*, vi., 86.
§ *Comptes Rendus*, xlii., 1088.

takes fire in an atmosphere of this gas, and is converted into gaseous chloride of boron. It is difficult to dry the chlorine so completely as to prevent the production of some smoke, consisting of boracic acid, originating from the reaction between chloride of boron and water. The crystallized boron burns without leaving any residue, and presents, meanwhile, an apparent intumescence similar to that which characterizes the combustion of diamond in oxygen.

Boron, when heated by means of the blowpipe between two pieces of platinum foil, produces an immediate fusion of the metal, owing to the production of a boride of platinum. It is not acted upon by any acids, singly or mixed, either in the cold or by the aid of heat. Only bisulphate of potash converts it into boracic acid at a bright red heat, with evolution of sulphurous acid. It is not acted upon by boiling concentrated caustic potash solution, but at a red heat is slowly dissolved by hydrate of soda and by carbonate of soda. Nitrate of potash does not appear to exercise any sensible action upon boron at this temperature.

Crystalline boron was prepared by melting boracic acid mixed with eighty per cent. of aluminum, in a carbon crucible, enclosed in a black-lead crucible, and the heat maintained for five hours in a furnace in which pure nickel may be easily melted. When the crucible is cooled and broken, it is found to contain two layers, one vitreous, and consisting of alumina and boracic acid; the other metallic, vesicular, iron grey, and containing small boron crystals. This layer consists of aluminum that is quite impregnated with boron. The whole of the metallic-looking portion is digested with boiling concentrated caustic soda, which separates aluminum, then with boiling hydrofluoric acid which removes iron, and lastly with a mixture of hydrochloric acid and nitric acid, which extracts traces of silicium that might remain after the treatment with caustic soda.

The boron thus obtained almost always contains laminæ, which must be separated by mechanical means, since it cannot be dissolved chemically.

Boiling water extracts much boracic acid from the vitreous mass and a gelatinous substance, which is almost pure alumina. The separation of boracic acid from alumina is quite in accordance with Rose's observations as to the action of water upon borates containing insoluble bases.

2. *Graphitic Boron.*—Aluminum dissolves some boron. When an alloy of boron and aluminum is dissolved in the same manner as recommended by these Chemists for the preparation of graphitic silicium, only a small quantity of graphitic boron is obtained. It may be easily prepared by decomposing fluoborate of potash with aluminum, using as a flux a mixture of chlorides of sodium and potassium in equivalent proportions. By this reaction small granules of boride of aluminum are obtained, which, when digested with hydrochloric acid, leave boron in the graphitic state. The laminæ thus obtained are often hexagonal, reddish coloured, and present a close resemblance to the graphitic modifications of silicium and carbon.

3. *Amorphous boron.* The boron prepared by Gay Lussac and Thenard was in this condition. It may be obtained in the preparation of crystalline boron when a small globule of aluminum is in contact with a large quantity of boracic acid. The reaction then takes place very rapidly; the aluminum does not dissolve the boron as quickly as it is liberated, and after the digestion with soda and acids there remains a bright chocolate-coloured substance, presenting all the characters of boron as it was described by Gay Lussac, Thenard, and Berzelius.

When amorphous boron is collected upon a filter, the portion adhering to the paper burns readily when dry, and with great brilliancy. Graphitic boron is not affected under the same conditions, and may be found in the ash of the paper.

It is inferred from these facts that boron has a greater analogy to carbon than silicium has in respect of its physical characters.

Crystallized Chromium and Alloys of Chromium.—M. Fremy* has obtained chromium in crystals, which possess great brilliancy, and belong to the cubic system. The crystals are very hard, and are not affected by the strongest acids, even aqua regia. The alloys of chromium with other metals are, in many cases, as hard as chromium, and likewise resist the action of acids. The alloy with iron was obtained

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* *Comptes Rendus*, March, 1857, p. 632.

either by reducing chromate of iron with charcoal, or by heating iron and pure oxide of chromium in a blast furnace. This alloy sometimes crystallizes in long needles; it resembles brass in appearance, and is very hard.

The green oxide of chromium may be easily melted by the heat of a forge, and is then converted into a black crystalline mass, which presents all the characters of the crystallized sesquioxide of chromium obtained by Wöhler by the decomposition of chloro-chromic acid. This melted oxide scratches quartz and hardened steel, and may probably be useful for some purposes on account of its hardness.

The crystals of chromium were obtained by decomposing the anhydrous chloride by means of sodium vapour, carried by a current of hydrogen gas through a tube at a red heat. In this way manganese and chromium may be obtained in a state of absolute purity.

THE ATLANTIC TELEGRAPH.

There were many curious companies formed during the South Sea speculative mania; but, among the list of impossible schemes which were then projected, we can find none so startling as that of a company which proposed to extract lightning from zinc and copper plates, and retail it to America at the rate of threepence per flash. Yet this is exactly what the Atlantic Telegraph Company not only propose to do, but which they have already more than half accomplished. After this, people may cease to regard as impossible the plan of profitably extracting sunbeams from cucumbers. If we were asked to point out any two things which more than others would serve to illustrate the wealth and genius of the country, we should not direct attention to the palaces, public buildings, or monuments which abound in every direction, but would recommend a trip down the river on a Greenwich steamer, which dodging its way amid the grimy colliers and vessels of all nations that crowd the Thames, passing muddy-looking creeks, the shattered and tumble-down warehouses which line each shore, would at length pass that huge iron wall of the Great Eastern steam-ship, over which hundreds of workmen swarm like busy ants, and against which they wield their tiny hammers, and with slow and gradual labour advance the monster ship each day some step towards completion. That, we would say, is one of the great things of which Englishmen may be proud. But a short distance beyond, at the bend of the river, there lies one of the finest ships of war in her Majesty's navy, the Agamemnon; her guns are taken out, and she is engaged in the peaceful occupation of coiling away in her capacious hold the submarine rope which is to connect the Old and New World. That is the second great fact which, in our opinion, would illustrate most forcibly the wealth, the genius, and the enterprise of the country. With the Great Eastern, and its 30,000 tons, bridging over the broad Atlantic, and reducing the voyage to a minimum of time, and the submarine telegraph burrowing under the ocean and beating time by several hours in the race to the New World, Britannia may well be regarded ruler of the seas while steam and lightning are the august ministers for carrying out her decrees.

In all probability, a month will not have elapsed before the telegraphic communication between England and America will be completed. The mode of making the rope which is to tie the knot of a closer alliance between the Old and New World we have described on former occasions; at present we will merely report progress respecting the coiling of the rope on board the Agamemnon. During the last month a small steam-engine has been working night and day without intermission in hauling into the ship from the works of Messrs. Elliott, Glass, and Co., of East Greenwich, the rope which they have prepared. The total length required to connect the two countries is 2500 miles, half of which is to be placed on board the Agamemnon at Greenwich, and the other half on board the Niagara, the American steam-ship, at Birkenhead. All the guns have been taken out of the Agamemnon with the exception of two small signal ones on the upper deck, and up to sunset on Friday 1100 miles of the rope had been stowed away. Those immense coils of tarred rope, rising up flake upon flake or layer upon layer from vast depths below the surface of the water to the under side of the deck of the ship, are a curious and interesting sight. You stand or walk over 1100 tons of this rope, for its weight is about one ton to the mile. There are more than 200 flakes or layers of the coil, one above the other, and the huge coil following the form of an oval or circle, as the shape of the ship's hold requires, and varying in its diameter from 44 to 50 feet, is already about 11 feet

thick, and at every beat of a second's pendulum an electric spark is flashed through every inch of that solid compact mass. The huge thing lives, and every throb of its electric pulse is marked by the deflection of a tiny, delicate needle on a dial-plate. From the moment the first coil was formed to the present time there has been no cessation of this strange galvanic life, and the fluid has passed through the atomic particles, not merely of the wire in the ship's hold, but through every atom of that which still remained in the manufactory on shore. From the immense batteries of Mr. Whitehouse, the electrician of the company, an amount of electric fluid is every moment sent on its circling mission of 1200 miles, which, if discharged at once, would—under certain electric conditions of the atmosphere, and below a thunder-cloud—form a lightning flash of the most terrific power. But trained by man, this concentrated essence of the thunder-storm passes instantaneously on its unseen path, does the bidding of his taskmaster in deflecting the small needle which keeps watch for its arrival, and, completing its mysterious circuit, returns obediently to the cell whence it first issued forth.

Some time since it was thought that the fluid would be so much retarded in its way through great lengths of wire, that it would be impracticable to apply electricity to the communication between England and America. This was a point most material to be decided, and a number of experiments were most carefully made to ascertain the speed of the electric current. Professor Wheatstone found that it travelled 288,000 miles in a second, or more than ten times the length of a girdle round the earth. Other experiments fixed its speed at 12,851 miles per second. In the currents of electricity sent through the 1200 miles of rope now lying partly on board the Agamemnon and partly on shore, Mr. Whitehouse has not been able to mark any appreciable speed of this mysterious agent. It might be thought that the electric messenger, having to run its round through the myriads of circling and concentric coils of rope, might not be able to travel so quickly as along a straight road; but gradients and curves are unknown to this bright Ariel, who asks only one favour—that he should be kept from coming in contact with the base earth while employed in the service of the Prosperos who direct his actions. All doubts with respect to the retardation of the electric current are set at rest, and an extensive series of experiments have shown that ten words may be whispered under the Atlantic, from Ireland to Newfoundland, every minute, or 14,400 words per day. Who shall calculate the effect upon the political and commercial relations of the Old and New World by this daily interchange of nearly 15,000 words? A very curious feature in connexion with this instantaneous communication between this country and America will be apparently the beating of time itself in the journey from England westward. Each 15 degrees of longitude west of London makes the time an hour later. New York or Montreal being 74° W., a message sent from London at noon would arrive in New York at seven o'clock in the morning, or about five hours before noon. If sent on to New Orleans, which is 90° W., it would arrive at six in the morning; and at San Francisco, which is 121°, a little before four A.M. If continued round the world, the electric telegraph would gain a whole day. Coming westward, however, our cousins will not seem to act with their usual "go-ahead" alacrity—the American lightning will not appear to be "greased"—for, starting from New York at noon, it will not reach us until five o'clock in the evening. There will, however, be great commercial advantages in this difference of time, inasmuch as all the messages transmitted from this side between ten in the morning and three in the afternoon will arrive in America by the time business has commenced there, and an uninterrupted line for the flow of the return messages will be secured.

It has not yet been decided in what mode the submarine cable shall be laid. It has been generally stated that the Niagara and the Agamemnon will proceed together, each having one-half of the cable on board, to a point midway between the coast of Ireland and Newfoundland, and, the two ends of the cable being joined together, the vessels will then start in opposite directions, the one eastward and the other westward, uncoiling the cable, and exchanging signals through it as the ships proceed. This plan is thought by some eminent persons, among others by Captain Noddall of the Agamemnon, to be open to several objections; and it is now proposed to commence "paying out" at once from the coast of Ireland, and when one vessel has uncoiled its share of the cable, to join the end to that on board the other vessel, which will then proceed to lay out the remaining half of the cable. The whole of the rope will be on board the two ships in the course of the next week, and the

Agamemnon will leave the Thames for Cork, where it will meet the American vessel, and operations will commence immediately, should the weather prove favourable. The whole of the telegraph plateau, on which it is proposed to place ths cable, has been again carefully surveyed by Captain Scott, the surveying officer of the Cyclops, and the results of the soundings made by Lieutenant Berryman, of the Arctic, and Lieutenant Maury have been confirmed. The section of the bed of the Atlantic presents a counterpart of the surface of the earth. There are lofty Alpine mountains, which the telegraphic cable must cross, and deep valleys along which it must be laid. Leaving the western shores of Ireland, the bed of the Atlantic slopes gradually, for about ninety miles, to the depth of 830 fathoms, or 4890 feet; there is then a sudden ascent to a plateau extending for twenty miles, at a depth of 230 fathoms. Again there is an immense slope down the side of the mountain of 1520 fathoms, or more than 9000 feet, terminating in an immense valley 1750 fathoms below the surface of the ocean, extending for several hundred miles, with small undulations of 100 or 200 fathoms. Again, there is a lower valley at the deepest part of the ocean, at 2330 fathoms; after which there is a gradual ascent in the direction of Newfoundland to a distance of 150 miles, where the depth of the water decreases to about 50 fathoms. The cable will be delivered in the first instance out of the hold of the ship through a trumpet-mouth tube, elevated about thirty feet above the top of the cone around which the rope is coiled. It will then pass over and under a series of "sheaved" or grooved wheels, where the amount of adhesion or friction of the rope will be regulated so as to counterbalance the weight of the cable in suspension in the water, and will thus afford perfect control over its delivery. As, in some parts, the depth at which the rope is to be laid will be rather more than two miles and a half, there would be, in the process of paying out, probably twice that extent of cable held in suspension; and as this weighs in water 14 cwt. to the mile, the necessity of adopting due precaution against the cable running away too quickly will be evident, and the machinery for providing against this contingency is of the most powerful description. Arrangements are also made, in the event of any accident, for cutting away the cable and securing one end of it to large buoys, fitted with mirrors, and provided with several miles of ordinary rope, and an auxiliary steam-engine is fitted up on board, to be employed for hauling in the buoy ropes when it is required to regain possession of the line.

The batteries to be taken on board for signalling through the cable while in progress of being submerged are of most extraordinary power. The zinc plates employed weigh three tons, and with the boxes and the acid together it is upwards of five tons. That a battery of very considerable power will be required for the purpose of signalling is clear from the nature of the duties required to be performed by the electric current. Starting from the deck of the Agamemnon, it would rush through the whole of the rope remaining uncoiled in that ship's hold, then, leaping overboard, it would dive down to the lowest depths of the Atlantic, skip along the mountains and valleys of old ocean's bed, mount to the surface, board the Niagara, flash through the uncoiled rope on board that ship, and, ringing the signal bell, tell that throughout its whole distance of two thousand five hundred miles it had met with no flaw and no obstruction. When the little bell on board gives forth no accustomed sound, the engines of the steam-ship will be reversed, the cable hauled in and examined, until the damaged part through which the electric messenger has escaped shall be discovered. When once laid in its ocean bed, there will be no disturbing current to endanger its safety, and the nature of the plateau on which it will be deposited leads to the opinion that in a very short time the soft sand of the ocean bed will form a perfect covering of the cable.

The rate at which messages will be sent will, we understand, be at the rate of £2 10*s*. for every twenty words, or an average of two hundred flashes of the electric current. The capital of the Atlantic Telegraph Company, consisting of £350,000, has been entirely subscribed in shares of £1000 each; and it is very confidently stated that, owing to the small amount of working expenses, the net receipts will pay a dividend of 40 per cent. on the capital. No remuneration is to be given to the promoters of the company until after 10 per cent. per annum has been paid to the shareholders, when the surplus profits will be equally divided between the company and the promoters. We have no doubt that the undertaking will be as successful in a financial point of view as we are confident it will be in scientific and engineering respects.—*Observer.*

ON THE HÆMANTLION, AN INSTRUMENT TO FACILITATE THE EXAMINATION OF THE BLOOD IN DISEASE.

BY HORACE DOBELL, M.D.,

Licentiate of the Royal College of Physicians, &c.

In attempting a systematic observation of the microscopic characters of the blood in disease, several serious difficulties present themselves.

1. There is no means of obtaining blood without inflicting pain.

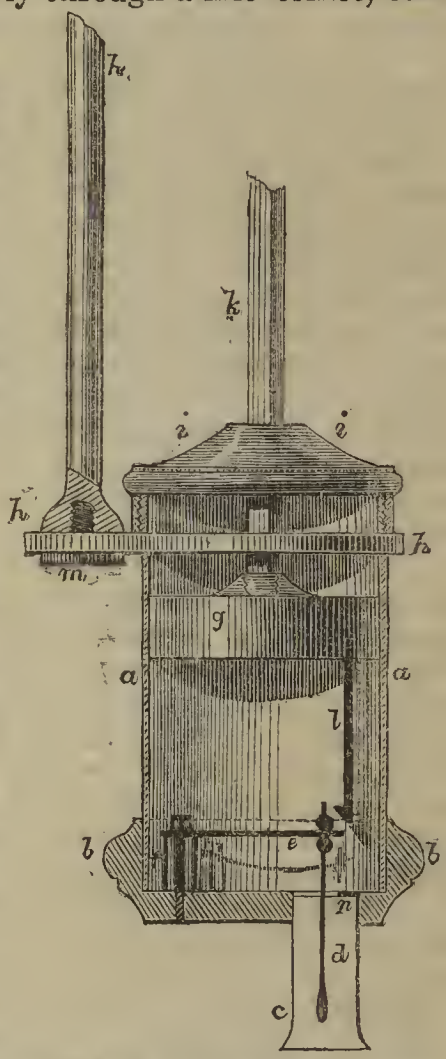
2. Venesection is seldom either necessary or desirable in the large majority of diseases.

3. Blood from a vein, when obtained, does not present the best specimen of the circulating fluid, and its physical characters change before the operation of venesection can be concluded, and the blood placed under a microscope.

4. Obtaining blood from the capillaries, by running a needle into the flesh, is attended with considerable pain, if inserted deep enough to ensure bleeding, and when thus obtained, the blood, having oozed out slowly through a fine orifice, consists principally of serum, the colourless corpuscles being especially deficient.

These difficulties have not presented themselves to me alone, but have been the principal, if not the only, cause for the poverty of knowledge on a subject of such interest as the microscopic characters of the blood in diseases.

I have removed these hindrances from my own way by contriving the little instrument, which I am about to describe to the Society, in the hope that it may be useful to others as well as myself. By it a drop of capillary blood may be obtained in a moment, without pain, as easily as we can feel the pulse, or look at the tongue.



Description of Figure.

A, a cylinder having a solid base, *b*, perforated at *n*, so as to communicate at that point only with *c*, a small glass receiver.

G, a piston to the cylinder *a*, worked by a rod *k*, which is four-sided, and moves in a four-sided aperture in *i*, to prevent its turning round, and having a ring at the end for the finger.

Attached to the piston is a slender rod *l*, having a spring trigger at its end, and descending through *n*, into the receiver *c*, when the piston is thrust down.

A spring, *e*, is connected with the needle *d*, which passes through the solid base of the large cylinder into the receiver below.

The needle, *d*, is so shaped at the point, that it shall cut an opening into the cuticle sufficiently wide to allow the blood, in its natural proportions of corpuscles and serum, to gush through and is not long enough to reach the surface of the flesh until discharged by the trigger.

A pistol-shaped handle is attached to the cylinder at *h*, *m*, *h*.

In using the instrument the orifice of the receiver is placed upon the skin of the patient, the upper arm being the most convenient place. The piston rod is raised by the finger in the ring, and thus the receiver is sufficiently exhausted to draw the flesh up into its cavity. As the piston rises, the trigger, at the end of the slender rod, catches the spring and rises it, and with it the needle. The moment the piston has reached the top of the cylinder, the flesh being well up in the receiver, charged with blood, and insensible to pain, the spring slips from the trigger and the needle is instantaneously darted into the flesh and withdrawn by the recoil of the spring, a drop of blood starting at the same moment to the surface.

The instrument can at pleasure be fitted with a needle having a wider cutting surface, by which several drops of blood may be obtained for *chemical* examination.

For the skill with which he has carried out my design, I am indebted to Mr. Kiessler, who is now engaged in constructing the instrument for Messrs. Ferguson, of Giltspur Street, Smithfield.—*Journal of the Society of Arts*, July 10, 1857.

ON THE ESTIMATION OF COPPER.

A PAPER on this subject has been recently read before the Chemical Society by Mr. E. O. Brown, assistant in the Chemical establishment of the War Department. The process described by Pelouze, which consists in dissolving one gramme of copper in nitric acid, mixing this solution with a large excess of ammonia, raising it to the boiling point, and dropping in a standard solution of sulphide of sodium until the blue colour disappears, and a precipitate is thrown down having the composition CuO, 5 CuS, the author found to give results which sometimes vary considerably. He remarked that whenever the contents of the flask were not shaken, but only agitated by boiling, a smaller amount of sulphide of sodium was required. He also experienced considerable difficulty in deciding on the exact point at which the blue colour disappeared, since, on agitating the liquid a short time after decoloration, the colour was restored, and this continued to be the case for a considerable period after its first disappearance.

These changes the author attributed to a portion of the oxysulphide of copper becoming oxydized at the expense of the salt of copper in solution, reducing the latter to the state of suboxide, thereby causing the blue colour to disappear before the whole of the copper is precipitated; from the great affinity of an ammoniacal solution of suboxide of copper for oxygen, agitating the liquid must necessarily give rise to a constant reproduction of protoxide of copper. A portion of the sulphur of the sulphide of sodium also passing into the solution, as hyposulphurous acid, or some other low oxide of sulphur, lessens the effect which the sulphide would otherwise produce.

The process proposed by Parkes, which consists in decolorizing the ammonio nitrate of copper with a standard solution of cyanide of potassium, the author found to be equally fallacious. The quantity of cyanide necessary to produce complete decoloration being in proportion to the length of time taken in the operation.

From a number of experiments which were made by the author, the reaction of iodide of potassium upon a salt of copper, which results in the production of subiodide of copper and free iodine, appeared likely to be available for this purpose. The amount of iodine thus liberated being determined by means of sulphurous acid. After further experiments, it was found, however, that the use of sulphurous acid would dilute the solution to an inconvenient extent; hyposulphite of soda was therefore substituted, and found to furnish results equally accurate. The process finally recommended by the author is as follows:—

Ten grains of copper are dissolved in dilute nitric acid, and the solution boiled until free from nitrous acid; it is then diluted with about an ounce of water, and carbonate of soda added until a portion of the copper is precipitated. Pure acetic acid is then added in excess, and the solution poured into a flask capable of holding about 12 ounces. About 60 grains of iodide of potassium are then thrown into the flask, and sufficient time having been allowed for the crystals to dissolve, a standard solution of hyposulphite of soda is added until the greater part of the iodine has disappeared, which is indicated by the liquid changing from a brown to a yellow colour. A little clear solution of starch is then added, and the addition of the hyposulphite of soda cautiously continued until no further effect is produced. The bleaching effected by the last portions of hyposulphite may be best seen by allowing the drops to fall into the centre of the flask whilst the liquid is in motion, when streaks of a lighter colour will be produced so long as any iodine remains.

When the quantity of iodide of potassium employed is less than six times the weight of the copper to be determined, satisfactory results are not obtained. Care must be taken that the iodide of potassium employed is free from iodate of potash, and that the acetic acid contains no sulphurous acid. The solution of starch should be made by boiling with a large quantity of water, any undissolved portions allowed to subside, and the clear liquid only used. The solution of hyposulphite is obtained by dissolving 4000 grains of the salt in two gallons of water, and standardized by means of electrotyped copper.

Several experiments were made in order to ascertain to what extent the results obtained by this process are liable to error from irregular manipulation or changes of temperature; from these it became evident that slight differences in the mode of manipulating do not in any way affect the results, so long as the solution is not heated.

The presence of tin, lead, iron, or zinc in small quantities is also immaterial; but when the alloy in which the copper is to be determined contains a large proportion of lead or iron, these metals should be previously separated from the solution, since the yellow iodide of lead and the red colour of the acetate of iron render it difficult to distinguish the effect produced by the last quantities of hyposulphite of soda.

PATENTS FOR COATING PILLS.

The following correspondence arrived too late for insertion in our last number :—

Edinburgh, 73, *Princes Street*, 26*th June*, 1857.

Sir,—In reference to Mr. Cox's letter upon the coating of pills, in this month's number of the Journal, I beg to state that, upon observing it, I wrote to Mr. Kemp, who is still in Paris, requesting that he would ascertain from M. Blanshard the date when he first used a varnish for coating pills, and whether his pills were *vended* in England prior to April, 1854, the date of Mr. Cox's patent. In reply he informed me that M. Blanshard made them in 1850, and that he (M. B.) had no doubt but that M. Jozeau, the French Chemist in the Haymarket, had vended them in London prior to 1854.

I enclose you a note of mine to M. Jozeau and his reply, which is conclusive in every respect, showing not only that he sold M. B.'s pills prior to that date, but that he himself coated pills with the ethereal tincture of balsam of tolu nearly as far back as 1840—fourteen years prior to Mr. Cox's patent! That gentleman's threat, therefore, to prosecute his brethren, is, I imagine, disposed of. Any infringement of his so-called patent "is not an act of dishonesty," and I dare say he will have more discretion than to "seek redress in the courts of law."

Your insertion of these letters—if possible, in the July number of the Journal—will oblige

Sir, yours truly,

To the Editor of the Pharmaceutical Journal. H. C. Baildon.

The passages marked with inverted commas are quotations from Mr. Cox's letter.

Edinburgh, 73, *Princes Street*, 20*th June*, 1857.

Sir,—Will you do me the favour to inform me whether you have kept M. Blanshard's pills of iodide of iron, which are coated with a varnish of ether and balsam of tolu, *prior* to April, 1854 ?

My reason for asking is simply this—I wish to ascertain the validity of a patent taken out by a party in England for varnishing pills in April, 1854.

Upon applying to M. Blanshard, he states his belief that you must have had these pills of his prior to this date (he having made them since 1850), although not directly from him.

If you have the *Pharmaceutical Journal* for May and June, you will see in the former number a communication made by me to the North British Branch, and in the latter a letter from the patentee, which I consider, to say the least of it, as very uncourteous. Your early reply will oblige, Sir,

Your obedient servant,

M. Jozeau, *Haymarket, London.* H. C. Baildon.

49, *Haymarket*, 23*rd June*, 1857.

Sir,—In answer to your letter, we are sure to have kept the Pilules de Blanshard *some time* before the date you mention, although it would be difficult to mention the exact time, as it would be a long way back to refer, and our invoices are in Paris. But beyond this we have made *ourselves* pills, coated with the ethereal tincture of balsam of tolu, nearly as far back as 1840 ; so that no question remains as to the validity of a patent taken out in April, 1854. I saw both the letters you refer to in the *Pharmaceutical Journal*, and had made up my mind to reply to Mr. Cox's, as I con-

sidered it a shameful piece of intimidation against parties who had used the process long before he had even dreamed of it.

I am, Sir, yours truly (for Gabriel Jozeau),

Mr. H. C. Baildon. E. Foster.

Extract from the Specification, dated April 1854.

"I, Arthur Hawker Cox, Chemist and Druggist, Ship Street, Brighton, in the county of Sussex, do hereby declare the nature of the said invention for improvements in coating pills and boluses, to be as follows :—

"Canada balsam, gum thus, frankincense, gutta percha, caoutchouc, gun cotton, or other gum or resin or material, insoluble in water or saliva, but acted on by the stomach, is dissolved in ether, turpentine, alcohol, naphtha, or other volatile solvent.

"The pills or boluses to be coated are covered, rubbed, or washed over with this solution by immersion therein or otherwise. The pills are then to be kept in motion till the solvent is sufficiently evaporated, to prevent the adhesion of the pills to each other.

"Another method of applying this covering is to reduce to powder a friable resin, gum, or material, insoluble in water, as aforesaid, but acted on by the stomach, and to coat the pills or boluses with the materials used, either by first covering them with the powder, and then with a proper solvent, or by first covering them with the solvent, and then with the powder. The solvent used is then evaporated from the surfaces of the pills or boluses.

"With either method the appearance of the pills or bolusses may be subsequently improved, by dusting them over with powdered French chalk or other powder."

The absurdity of the patent is attested by the following letter from the Patentee:—

TASTELESS PILLS.

Brighton, July 20th, 1857.

Sir,—My only object in writing my former letter was to guard your readers from taking that for new which had been the subject of two separate patents. Of course I knew that, when a plan was proved to be successful, there would always arise some unscrupulous men—wretched imitators. Practical men, like the majority of your readers, will soon discover that pills covered with an ethereal tincture of tolu will, in most cases, pass through the stomach unaffected.

I am, Sir, your obedient servant,

To the Editor of the Pharmaceutical Journal. Arthur H. Cox, Chemist.

THE DANGEROUS USES TO WHICH STRYCHNINE IS APPLIED, AND THE SALE OF POISONS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

In the Journal for July I notice a paper "On the Detection of Strychnine," by Dr. Stevenson Macadam, in which the author mentions the severe loss occasioned to farmers and others of their valuable sheep dogs. A similar case came under my own observation some few weeks back. The tenants of a noble lord, within a few miles from this, were greatly annoyed by the loss of various domestic animals, until at length they determined to discover the cause, if possible. Shortly after, a sheep dog suddenly died, and was opened; its stomach was found to contain pieces of bacon in a half masticated state, which, on analysis, yielded strychnine very largely, and on searching the neighbouring fields several pieces of thick, solid bacon were found, which had been carefully slit open, strychnine inserted, ingeniously closed, and the whole half roasted. Owing to pressure of time, the strychnine taken from each piece was not weighed, but estimated at least to be 10 grains.

Now, it requires no great stretch of imagination to conceive a poor person, accidentally passing, picking up a piece of the (apparently) good and fresh-roasted bacon, to partake of it, and be poisoned; or perhaps he may have a family, with whom he may wish to share it, proving fatal to all. Now I would ask—1st. Who would be the culpable party in such a case, the Chemist who supplied the strychnine

or the person who makes such indiscriminate use of so deadly a poison* ? 2nd. Does not this forcibly point out the necessity of regulating, in some way or other, the sale of poisons ?

And now comes the difficult question, "How is the sale of poisons to be regulated?" It appears to be generally understood that the Bill, as first brought before the House of Lords by Earl Granville, would not practically work ; for instance, is not the idea of colouring poisons absurd? Would it prevent a person being poisoned in the night? Would it prevent its being added to cocoa, coffee, or any other coloured body? Again, if a person wishes to commit suicide, would the colour of the poison deter him from it? If you refuse supplying him with poison, he either hangs or drowns himself; and thus, if he be determined to destroy himself, no legislation, no Act of Parliament, can prevent him.

But can you prevent his poisoning another? Certainly not by colouring the substance, as shown above ; but I think you may, in a great measure, by adding some substance which shall give a *taste* or *flavour* to the poison. This, I think, would be a very great obstacle to the criminal administration of poisons, for it would be quite as difficult to give at night as in the day, and the colour of the vehicle would be no object.

If there must be an Act of Parliament, it should be to the effect, that all Pharmaceutical Chemists keep poisons in a pure state, but that they retail it not without giving the requisite taste and flavour under a heavy penalty.

There may be objections to the flavouring, &c., of poisons ; if so, I should be glad to hear them.

Yours, &c.,

Leamington, July 11, 1857. EDWARD SMITH.

[*Both parties are culpable, but the responsible party is the one who picks up the bacon and eats it; as a person picking up a pair of gloves on the road and putting them on would be responsible for the result, if in the course of three days he found that he had caught the itch.—ED.]

POISONING BY ARSENIC.

MIDLAND CIRCUIT.—LINCOLN, JULY 25.

Crown Court, before Mr. Justice Erle.

THE case of Thomas Fuller Bacon caused considerable excitement and crowding of the court, as the prisoner had been previously charged with arson, and with the murder of his own children: the present charge being that of murder, or administering poison with intent to murder his mother, Mr. Mellor, Q.C., for the prosecution elected to proceed on the second indictment. We have no time or space for a report of the trial, which was delayed some hours on account of the absence of Dr. A. S. Taylor on a nuisance case in Durham. The decease of the prisoner's mother occurred in 1855, but no suspicion at that time existed. Subsequent circumstances led to the present inquiry, and on the exhumation of the body Dr. Taylor discovered undoubted evidence that arsenic had caused death. The purchase of arsenic by the prisoner was also proved, with other circumstances, completing the chain of evidence. This case shows the *value* of arsenic for criminal poisoning, on account of the facility of its detection at any subsequent period. For the defence it was attempted to implicate the wife of the prisoner, who is under confinement as a lunatic, but the evidence was rejected as irrelevant. The jury returned a verdict of Guilty, and the learned judge ordered that sentence of death should be recorded.

POISONING BY SULPHURETTED HYDROGEN.

AN inquest, extending over two days, was held June 23rd before William Lumb, Esq., coroner, on the bodies of Joseph Armstrong, the elder, Mary Armstrong, Robert Armstrong, Joseph Armstrong, the younger, John Sloane, and Fenton Murray, who died from the effects of sulphuretted hydrogen gas. The Court was held in the Hematite Iron Company's Schoolroom, Cleator Moor.

Mr. J. Postlethwaite, solicitor, Whitehaven, attended on behalf of the Hematite Iron Company, and Mr. G. Armstrong, solicitor, Workington, on behalf of the owner of the houses in which the deaths occurred.

After the examination of several witnesses as to the death of the persons above

mentioned, and the strong smell of the gas in the houses, Professor Taylor read his report, in which the examination of the houses as to ventilation, and the experiments made to determine the nature of the gas, are detailed, and concludes as follows :—

"Applying my mind to the evidence thus adduced, to the inspection of the houses, and the locality where these deaths occurred, and aided by experiments which I have been enabled to perform, I have come to the conclusion already arrived at by the medical gentlemen who have given their evidence at this inquest, viz.—

"1st. That the six persons deceased, into the cause of whose death we are inquiring, did not die from any natural or unusual form of disease, but that they died from the effects of gaseous poisoning ; and my opinion is that the noxious agent was sulphuretted hydrogen.

"This gas did not emanate from the iron furnaces, nor from the surface of the slag heap directly ; but it proceeded from the rainfall (about the period of the calamity) penetrating the heap, and washing the sulphuretted hydrogen beneath the foundations of the houses, at the back of which it is piled. Further, the contact of water with the sulphide of iron contained in the slag produces this poisonous gas, so that the rain water already containing sulphuretted hydrogen, produced by contact with the iron slag beneath the houses, a larger amount of this gas would find its way through every crevice or porous material. Thus, then, the action of water on the iron slag is, in my opinion, the cause of the production of this gas. It is going on at all times, in a ratio proportioned to the undecomposed sulphide of iron present, and the quantity of water which finds its access to the foundation. When once there, there is no escape for this gas but through the floor and the whole of the house. Its evolution at the period of the calamity was greater, by reason of the heavy rain preceding the occurrence, and the heated state of the atmosphere.

"It has been given in evidence that the slag laid beneath the floor of the houses was taken fresh from the iron works, when the houses were built, about six months since. As it had not been exposed to the air sufficiently long to decompose the sulphide of iron, it was therefore used in a state most calculated, under a copious supply of water, to produce sulphuretted hydrogen in the largest amount.

"That this was the source of the gas which caused death, appears to me to be proved,

"1st. By the discovery of the gas in large quantities, evolved with steam, at a depth of two or three feet below the slag heap.

"2nd. By the discovery of the gas actually evolved when the floor was raised on Monday last in the house 49.

"3rd. By the presence of such a substance as sulphide of iron in large quantities from the slag of the foundations of the houses as well as from the heap.

"4th. That there was no other source for its production, if we except the presence of sulphide of calcium in the slag heap, which would considerably add to and augment the danger arising from heavy rain falling on the heap. This arises from the fact that sulphide of calcium is instantly and completely decomposed by water, while sulphide of iron is more slowly decomposed.

"That this deadly poisonous gas was evolved beneath the floors and penetrated the houses, accumulating in those places where there was the least ventilation and no current of air, is proved,

"1st. By the discovery of it in the porous soil beneath the floor.

"2nd. By its action on patches of paint in the lower rooms.

"3rd. By the discovery on the floor of a damp house, No. 16, which had not been disturbed for some time, of the oxide of iron, sulphur, and sulphuric acid.

"This material is the result of the decomposition of sulphide of iron in the slag under exposure to air and moisture. It is the solid part of the decomposed slag, while the sulphuretted hydrogen is the gaseous part.

"That this gas was the cause of death, is proved by the symptoms and appearances taken as a whole. They are similar to, but more severe and fatal, than those which I witnessed in 1839, in men working at the tunnel under the Thames. (*Medical Jurisprudence*, 5th edition, 791 pp.) The sulphuretted hydrogen was produced by the action of water trickling through the soil on sulphide of iron contained in the soil.

"In conclusion, I beg to make this general observation. Every house built on this fresh iron slag is exposed to accidents of this kind, according to the access of water beneath the foundation. The quantity of fresh slag present beneath the

foundation, the porousness or imperfections of the floor, and the general want of ventilation in the closets or chambers, having no current of air through them, becoming boxes for the reception and circulation of this poison ; and the four houses from No. 49 to 46 are so situated, with respect to the slag heap, as to be houses of death to all who inhabit them with the doors and windows closed, and under heavy rainfalls. None can inhabit them without injury to health, if not danger to life. This danger will exist in all the houses more or less, until the slag heap is entirely decomposed. The houses 49 and 46 will always be dangerous, so long as the washings of the slag heap can find their way beneath the foundations."

After the coroner's charge, the jury retired, and, after deliberation, returned the following verdict :—

"We find that Joseph Armstrong, the elder, Mary Armstrong, Robert Armstrong, Joseph Armstrong, the younger, John Sloane, and Fenton Murray, have come to their deaths accidentally, and that the cause of death in all these cases has arisen from the inhalation of sulphuretted hydrogen gas, generated from the slag underneath the houses in which they dwelt, and from the adjoining heap of the same material. "W. B. Clarke, Foreman.

"In returning the above verdict, the jury recommended that the houses at Bowthorn Row, built upon the slag from the Hematite Iron Works, should be efficiently drained, and all communications with the adjoining slag heap, through the foundations of the houses, be effectively cut off ; and the jury are further of opinion that the houses so circumstanced cannot be safely occupied till this is done."

POISONING BY WHITE PRECIPITATE AND WHITE HELLEBORE.

The following cases are reported in the *Lancet* of July 4, by J. Giles, Esq., M.R.C.S.L.:—

P. T——, a young woman, brought home, on May 22, 1857, a powder obtained from a Druggist, and took it, mixed in a cup of tea, at about half-past five, P.M. She immediately became very sick, and continued so, suffering also much pain at the stomach. Her mother being alarmed as to the character of the powder, brought the cup from which she had taken it at about ten, P.M. The cup was coated with an incrustation, which on analysis proved to be ammonio-chloride of mercury. On visiting her, she was suffering much pain, and had been purged frequently. An emetic of sulphate of zinc was administered, and milk was directed to be given, there being nothing better at hand. The gastro-intestinal irritation had abated by the next day, but great swelling of the face and gums came on with salivation, which lasted several days. She was convalescent by the beginning of June. She stated that she had asked for "precipitate." The paper was marked "white precipitate, 1*d*." She would not state with what object she had bought the powder; but there is some reason for thinking that it was with the idea of curing the venereal disease. On buying the same quantity at the same shop, and comparing it as well as was possible with the quantity left in the teacup, it appeared that she could not have taken much less than half a drachm. Pereira states that white precipitate is largely adulterated with sulphate of lime; but this sample appeared to be almost pure, being nearly altogether dissipated when heated on platinum foil.

A case of poisoning by white hellebore has recently occurred under the care of my brother, Mr. F. Giles:—A man feeling unwell, and purposing to take some cream of tartar, swallowed by mistake about half an ounce of white hellebore in powder. The paper which contained the powder was marked "Poison." Feeling sick and in pain, he sent for assistance about twelve at noon, four hours after taking the poison. Emetics and enemata were given, and he speedily recovered. The symptoms were purging, pain at the stomach, burning sensation of the mouth and throat, but no vomiting until after an emetic. There was no giddiness or other cerebral symptom.

POISONING BY PRUSSIC ACID.

On Saturday evening Mr. W. Carter, coroner for East Surrey, instituted an inquiry at the Albany Arms Tavern, Albany-road, Camberwell, relative to the death of Mr. James Sebastian Yeates, aged sixty-two, a stockbroker, residing in the Crescent, Albany-road. Mr. George Edward Yeates, the deceased's son, on Thursday

morning last fonnd his father lying in bed dead. He then went for Mr. Gower, a surgeon, who attended. About twelve the same day witness again went to his father's room, and there perceived on the dressing-room table a small bottle, not labelled; but there was a cork, which, however, did not quite fit. He took up the bottle, and found it smelt very strongly of almonds. When witness first entered the room in the morning there was no such smell pervading the room, and Mr. Gower, the surgeon, did not notice the bottle. Mrs. Letitia Yeates, the wife of the deceased, who was dreadfully agitated, proved that she had never seen the bottle produced, and that when she went into the room after her son George arrived, she did not smell anything peculiar. Mr. Thomas Griffith, surgeon, of High-street, Peckham, said he found the deceased in bed dead. While in the room he noticed a phial on the dressing table, which he took up, and at once detected a powerful smell of prussic acid. He went to the body of Mr. Yeates, and, pressing on the chest, placed his nose to the mouth, but could not smell anything. He took possession of the phial, which contained about half an ounce. He had made a *post-mortem* examination, and when he opened the body the smell of prussic acid was very powerful. He had not the slightest doubt that the deceased died from the effects of that poison. The witness added that he went down stairs, and, addressing one of Mr. Yeates's daughters, asked her if she could give the slightest clue to the cause of her father's death, and she said, "Have you seen the bottle?" The whole of the family declared that they had never seen the bottle containing the poison before it was found on the dressing table. The coroner said the last statement made by Mr. Griffith was most important, and he should not be doing his duty if he allowed such a case to pass without the fullest investigation, as the circumstance of the bottle not being found in the morning, and no one detecting the smell of the poison, was most strange. He should therefore adjourn the case for a few days, to examine the young lady who made the statement to Mr. Griffith relative to the bottle containing the poison.—*Times*, July 21.

POISONING BY LAUDANUM.

An inquest was held on Tuesday, at Taunton, by Mr. W. W. Munckton, coroner for West Somerset, on the body of Mary Ann Arscott, an aged widow residing in Mary Street, Taunton, who died on the preceding Saturday from the effects of an overdose of laudanum, taken for tincture of rhubarb. The deceased discovered her mistake immediately after she had swallowed the poison on Friday morning. Mr. Welsh, surgeon, was at once called in, and emetics and other means were employed to counteract the effects of the laudanum. She, however, fell into a state of stupor, and died about 5 o'clock on Saturday morning. The jury returned a verdict to the effect that the deceased died from the effects of poison administered by herself in mistake.—*Times*, July 23.

POISONING BY ARSENIC.

Thames.—Mr. Abraham Meldola, Chemist and Druggist, of Leman Street, Whitechapel, appeared before Mr. Selfe to answer a summons taken out by Mr. Samuel Jessop Burch, the resident medical officer of the London Hospital, and which charged the defendant with selling to the late William Bush four ounces of arsenic, the same not being mixed with soot or indigo in the proportion specified in the 3rd section of an Act for regulating the sale of arsenic, the 14th of Victoria, chap 13.

Mr. Burch wished to state that a man, who gave the name of William Bush, was brought to the London Hospital a few days ago, poisoned by arsenic, from the effect of which he died a few minutes after his admission. The attention of the hospital authorities had been most particularly called to that case, and they thought great blame attached to the defendant, who had sold four ounces of arsenic to the deceased without the presence of a witness, and without complying with any of the forms prescribed by law. The hospital authorities had no vindictive feeling to gratify, and had no wish that the full penalty of £20 should be inflicted on the defendant.

Mr. Samuel Ryan, Surgeon, of Leman Street, Whitechapel, said he was called upon to attend a man named William Bush, at 96, Leman Street, on the 20th of June, and found him labouring under the effects of poison. The patient said he had taken two large tablespoonfuls of arsenic.

Mr. Burch said the deceased Bush was brought to the London Hospital at the time in question, and died a few minutes afterwards. His sudden death was caused by arsenic, of which he had taken very nearly, if not quite, an ounce. The paper now produced by Mr. Ryan contained three ounces of solid arsenic. It was uncoloured. The defendant stated at the inquest held upon the body of the deceased, that he had sold a quarter of a pound of white arsenic to him. The defendant also pleaded ignorance, and said that although he had been in business forty years he was not aware of the existence of an Act regulating the sale of arsenic, and that sooner than such a thing should happen again, he would destroy all the poisons in his shop.

Mr. Meldola.—Which I have done.

Mr. Selfe fined the defendant 40*s.* and costs.

The penalty was instantly paid.—*Times*, July 2nd.

THE SALE OF POISONS BY APOTHECARIES AND DRUGGISTS.

The following Report from the Censors of the College of Physicians was presented to the College at the *Comitia Majora*, on Thursday, June 25:—

"At the end of a year of visitation, the Censors having inspected, as they believe, every shop in the city, have the satisfaction of reporting that improvement is gradually taking place in all the Apothecaries' shops within their appointed district. In many instances they have had occasion to express their marked approbation, and have found much to commend in nearly all. The Censors have especially directed their attention to the care taken of poisonous drugs, and the method of their sale. They again found occasion to commend many methodical attempts to indicate poisonous drugs, so as to avoid accidents in dispensing them. They consider, however, that the extension of sound chemical knowledge among the Druggists and dispensers of medicines would be the most effective safeguard against accident; and, as regards the public, they consider that a wider knowledge of the nature of poisons and their effects, and the certainty of their detection when administered, would tend most effectually to restrain both the criminal and the careless use of them.

(Signed) "James Alderson, William A. Guy, Patrick Black, Henry Pitman } Censors.

"*Royal College of Physicians, June* 25, 1857."

THE GLASGOW POISONING CASE.

The evidence taken at this important trial, which extended over nine days, is so voluminous, that we can only give the more important facts of the case. The trial commenced before the High Court of Justiciary at Edinburgh, on Tuesday, June 30. The presiding judges were the Lord Justice Clerk, Lord Ivory, and Lord Handyside.

The Lord Advocate, the Solicitor-General, and Mr. Mackenzie, advocate depute, with Mr. Brodie, Crown agent, appeared for the Crown; and the Dean of Faculty (Mr. John Inglis), Mr. George Young, and Mr. A. Moncrieff, advocates, with Messrs. Rankin, Walker, and Johnston, writers to the Signet, Edinburgh, and Mr. Forbes and Mr. Wilkie, writers, Glasgow, appeared for the prisoner.

The indictment charged the prisoner, Madeleine Hamilton Smith, with intent to murder, as also with murder, and set forth that on the 19th or 20th of February last the pannel, in the house in Blythswood Square, Glasgow, occupied by James Smith, her father, did wickedly and feloniously administer to Emile L'Angelier, or Pierre Emile L'Angelier, now deceased, and then in the employment of W. B. Huggins and Co., merchants, Glasgow, as a clerk, or in some other capacity, and then residing with David Jenkins, or Ann Duthie or Jenkins, his wife, in Franklin Street, Glasgow, a quantity or quantities of arsenic or other poison to the prosecutor unknown, in cocoa or coffee, or some other article of food or drink, with intent to murder the said deceased; and that he, having taken the said arsenic or other poison so administered by her, did in consequence thereof, and immediately or soon after taking the same, suffer severe illness; that on the 22nd or 23rd of February, in the house in Blythswood Square aforesaid, she repeated the crime with like intent and

consequences; and, finally, that on the 22nd or 23rd of March, in the same house in Blythswood Square, the pannel did wickedly and feloniously administer to the said deceased a quantity or quantities of arsenic or other poison, in some article or articles of food to the prosecutor unknown, and the said deceased, having accordingly taken the said poison or part thereof, so administered, did in consequence thereof, and immediately or soon thereafter, suffer severe illness, and on the 23rd of March died, and was thus murdered by the said prisoner.

It appears from the evidence of *Mrs. A. Jenkins*, with whom L'Angelier lodged, that he had an illness about the 12th of February. The night before he wished for a pass-key, stating that he might be late. On witness going to his room in the morning, she found that he had vomited a quantity of greenish matter, and complained of great pain in the bowels, and of thirst. At eleven, o'clock A.M., he went out to consult a medical man. About the 22nd of February he had a second attack, attended with vomiting, and great pain as before. Dr. Thomson was sent for, who prescribed some powders. A few days afterwards L'Angelier went to Edinburgh, and returned to Glasgow on the 17th of March, remaining till the 19th, when he told witness he was going to the Bridge of Allan, and gave directions for any letter to be forwarded to him; a letter came the same day, and was forwarded accordingly. He returned to Glasgow on the 22nd, about nine o'clock in the evening, and appeared in good health. He requested to have a pass-key, and then went out. About half-past two o'clock in the morning witness heard the bell ring violently, and on going down found L'Angelier suffering great pain, and before he could be undressed he vomited violently, as on the previous occasions. Dr. Stevens was sent for, but as he could not attend, he sent a dose of laudanum, and ordered mustard plasters to be applied. At seven o'clock he was worse, and Dr. Stevens was again sent for; he came, and ordered the mustard to be applied immediately, and gave a dose of morphia. At nine o'clock deceased wished witness to draw the curtain, saying, "If I could get five minutes' sleep I should be better." Witness then left him, thinking he had fallen asleep, but when Dr. Stevens arrived shortly afterwards, he found him dead.

The evidence of Dr. Thomson, who attended L'Angelier in his former illnesses, and that of Dr. Stevens, who attended him in the last attack, was to the effect that they considered the symptoms to be those arising from bilious fever.

Professor Penny stated that he received a bottle, the contents of which he was requested to analyze: it consisted of a stomach and a reddish-coloured fluid. The stomach contained about 82 grains of arsenic, in addition to 5 grains which had been reduced into powder in the process of testing. The conclusions of the first report of the analysis were, that the stomach and its contents contained arsenic, and that the quantity was considerably more than sufficient to destroy life. The conclusions of the second report of the analysis were, that the body of the deceased contained arsenic, and that it must have been taken by him while living. Witness also examined the arsenic bought of Mr. Currie and of Mr. Murdoch, chemists, Glasgow. That of the former contained 94.4, and that of the latter 95.1, of pure white arsenic. Mr. Currie's arsenic contained particles of indigo, Mr. Murdoch's carbonaceous matter. Witness considered it would be dangerous to use arsenic as a cosmetic; if rubbed into the skin, it might produce symptoms of poisoning by arsenic. Arsenic mixed with lime was sometimes used as a depilatory; but that was the yellow sulphide, not arsenious acid. Cocoa and chocolate were substances in which a considerable dose of arsenic might be conveyed. He had found by actual experiment, that when 30 or 40 grains of arsenic were put into a cup of warm chocolate, a large portion settled at the bottom of the cup; but when the same or larger quantity was boiled with the chocolate, instead of being merely mixed, none of it settled down. The soot could not be entirely separated from the arsenic by washing, but a large quantity might be removed in that way.

Professor Christison stated, he had received various substances from Dr. Penny, said to be portions of the body of L'Angelier; had made analyses of these, to see if they contained arsenic, or any other poison; and found arsenic. Examined the white powder found in the stomach of deceased by Dr. Penny, which proved to be oxide of arsenic. The Lord Advocate having described the symptoms of L'Angelier's repeated illnesses, Dr. Christison said he had no doubt that the cause of death was poisoning by arsenic. Had true indigo been administered with the arsenic, witness thought it might have been found; the indigo mixed with Currie's arsenic appeared to be what is called waste indigo.

Amadée Thuot, and *Auguste Vauverte de Meau*, Chancellor to the French Consulate, Glasgow, were both acquainted with deceased, and spoke to his general character.

The declaration of the prisoner was then read, to the following effect. She had been acquainted with L'Angelier for the last two years; he had recently paid his addresses to her. They had met on various occasions; had not seen L'Angelier for about three weeks before his death. The last note she wrote to him was on the Friday before his death—namely, March 20th; in consequence of which note she expected him on the 21st, but he did not come, and sent no notice. Arrangements were made for their marriage. Remembered giving him cocoa one night from her window, but could not specify the time. Had bought arsenic on various occasions, and had used it all as a cosmetic, applying it diluted with water to the face and neck; had said it was for the purpose of killing rats, not wishing it to be known that she used it as a cosmetic. Mr. Minnoch had made a proposal of marriage, and she had accepted him, but the time for the marriage had not been fixed. Her object in writing the note of March 20th to L'Angelier was to have an interview, for the purpose of telling him of her engagement with Mr. Minnoch. On the night of the 18th of March was the last time she used arsenic. She never administered, or caused to be administered to L'Angelier, arsenic or anything injurious.

After the declaration of the prisoner was read,

Mary Jane Buchanan deposed that she accompanied the prisoner to Currie's shop to obtain arsenic; the purchase was made openly, and for the alleged purpose of killing rats.

William Murray, lately in the service of Mr. Smith, stated that he was sent by Miss Smith to Dr. Yeamen's, with an order for "a small phial of prussic acid," but could not obtain it. Dr. Yeamen corroborated this statement.

George Murdoch, Chemist, proved the sale of arsenic on Feb. 21st, by the register kept for that purpose; and the evidence was corroborated by James Dickie, his assistant.

George Halliburton, assistant to John Currie, Druggist, stated that he sold arsenic to Miss Smith on the 6th of March, the entry on the register being—"March 6, Miss Smith, one ounce of arsenic, to kill rats." The prisoner applied for the same quantity on the 18th of March, stating that the former quantity had been so successful. Mr. Currie made some objection to the sale, but when witness told him Miss Smith had had it before, she was allowed to have it. Witness never heard of arsenic being used as a cosmetic; the yellow sulphuret was sometimes used as a depilatory.

John Currie, Druggist, corroborated Halliburton's evidence as to the sale of arsenic on the 18th of March.

William Harper Minnoch stated that he was acquainted with Miss Smith and her family—had made proposals of marriage to her, and was accepted on the 28th of January; it was arranged more particularly on the 12th of March.

Dr. Robert Telfer Corbett assisted in the examination of the body of L'Angelier, and concurred in the report then made. The conclusion come to was that deceased had died from the effects of irritant poison. The morbid appearances were of two kinds, one showing the recent and immediate action of irritant poison, and the other effects of some antecedent administration. The ulcers on the duodenum were such as an irritant poison administered a month before might have produced: considered the inflammatory action and ulceration indicative of the administration of arsenic. Jaundice was not a common, but an occasional, symptom of irritant poison; extreme thirst was one of the symptoms, and showed itself very early. In the cross-examination, witness said that he stated on the authority of Dr. Taylor that jaundice was a symptom: thought Taylor referred to Christison as his authority. Witness was here corrected by the Dean, who said Taylor referred to Marshall, not Christison.

Dr. Penny recalled. He had made experiments as to the effect of the colouring matter in the arsenic of Murdoch and Currie; had administered Murdoch's to a dog, and found no difficulty in detecting the soot in the stomach of the dog; had himself coloured arsenic with indigo, and administered it to another dog, and had no difficulty in detecting the indigo in that case: administered to another dog a portion of the arsenic sold by Currie, and detected black particles in the stomach, but could not undertake to identify the arsenic found with the arsenic given: could

detect no arsenic in the brain, but found it in the stomach, as well as in the texture of the stomach: made himself acquainted with the quality of the colouring matter in Currie's arsenic before administering it; the particles found in the dog's stomach bore a close resemblance to the colouring matter, both in their physical appearance and their chemical properties—were, indeed, identical.

Christina Haggart, or Mackenzie, formerly servant to Mr. Smith, deposed to one or two clandestine interviews between the prisoner and deceased, but could not fix the date.

Mary Arthur Perry had been a confidante of L'Angelier in his secret attachment. On the 9th of March he said to witness, "I can't think why I was so unwell after getting that coffee and chocolate from her;" and then added, "It is a perfect infatuation I have for her; if she were to poison me I would forgive her."

Dr. Christison recalled. He considered it would be very unsafe to use arsenic by putting an ounce into water and washing in it, and should expect inflammation of the eyes and nostrils to result. Arsenic was not absolutely insoluble in cold water, as a 500th part would probably be dissolved; but water boiled with arsenic retained, on cooling, about a 32nd part in solution. As to whether arsenic had any taste was a controverted point. Orfila maintained that it had taste; but, from experiments made by witness and two other scientific gentlemen, so far as it was possible with so dangerous a substance, the taste was found to be very slight indeed—a little sweetish.

The letters, which were very numerous, and of a very extraordinary character, were then read.

A great number of witnesses for the defence were examined as to the character of L'Angelier, some of the witnesses stating that he had on several occasions attempted suicide, and that he once said he thought it no sin: that he was in the habit of taking arsenic himself, and of giving it to horses, whilst some of the witnesses spoke of his boasting and untruthfulness.

Dr. Lawrie, Glasgow, stated that he had tried the effect of arsenic on the skin; had tried $\frac{1}{4}$ to $\frac{1}{2}$ oz. of Currie's arsenic in water, and washed his hands and face with it freely, without any bad effects.

Dr. Douglas Maclagan, Edinburgh, also thought that the quantity of arsenic dissolved in cold water would be so small, as to produce very little effect on the skin, and that there would be no danger in so using it.

The Lord Advocate addressed the jury in a speech of five hours, going over the evidence very minutely; he endeavoured to show that the acquaintance between L'Angelier and the prisoner had begun and ended in an engagement; that subsequently a coolness had arisen on the part of the prisoner, who, having a more eligible offer in view, was anxious to extricate herself from the position with L'Angelier, and to obtain possession of her letters; that having failed in this she had prepared for an interview, which interview having taken place, she did accordingly administer the arsenic as stated in the charge.

The Dean of Faculty addressed the jury on behalf of the prisoner in an able speech, contending that it was not proved that the prisoner and L'Angelier met on the 19th of February; that it was not proved that she possessed arsenic until the 21st of February; and that there was an absence of all proof that they met on the night before the death of L'Angelier.

The Lord Justice Clerk then summed up, reading and commenting on the whole of the evidence. In his caution to the jury, his Lordship said they were not to proceed on suspicion, or even strong suspicion, but there must be strong conviction in their minds; if there was any reasonable doubt, it was their duty to give the prisoner the benefit of that doubt; but if they came to that clear conviction of her guilt, they were not to allow any suggestion made for the defence to deter them from doing their duty.

The Jury, having retired for about half an hour, returned the following verdict: "We find the prisoner *Not Guilty* on the first count, and *Not Proven* on the second and third."

A BILL FOR PREVENTING THE ADULTERATION OF ARTICLES OF FOOD OR DRINK.

WHEREAS the practice of adulterating articles of food and drink for sale in fraud of her Majesty's subjects, and to the great hurt of their health, requires to be repressed by more effectual laws than those which are now in force for that purpose: Be it therefore enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

I. The local authority for executing this Act within the places mentioned in Schedules A and B annexed to an Act passed in the nineteenth year of the reign of her present Majesty, intituled "An Act for the better local management of the metropolis," shall be the vestry and district board respectively appointed for executing such last-mentioned Act within such places respectively; and in all other places the local authority for executing this Act shall be the local authority acting there in execution of any general Act in force for the time being for the removal of nuisances.

II. The charges and expenses incurred in executing this Act in the respective places wherein such local authority is a vestry or district board under the said Act of the nineteenth year of the reign of her present Majesty shall be defrayed out of monies to be raised in like manner as monies are by the same Act required to be raised by such vestry or district board for defraying the expenses of such vestry or board in the execution of their powers and duties under that Act; and in places where the local authority appointed for the execution of this Act is the local authority for the execution of any such general Act as aforesaid for the removal of nuisances, such charges and expenses shall be defrayed out of monies to be raised in like manner as monies are for the time being required to be raised by any Act of Parliament for the purposes of the local authority acting in execution of any such general Act as aforesaid.

III. Within months from the passing of this Act the local authority shall, for the place over which it has jurisdiction as aforesaid, and which shall for the purposes of this Act be deemed its district, appoint one or more persons to be called "food inspector" or "food inspectors" of such district, and also a person skilled in Chemistry and Pharmacy to be called "Chemical food examiner" of such district, and shall also appoint convenient places for the respective offices of such inspectors and chemical food examiner, as also a proper warehouse wherein to lodge such articles of food and drink as may be seized under the provisions of this Act, and shall furnish such offices and warehouse respectively with all materials necessary for the execution of the duties of such inspectors and chemical food examiner respectively; and such local authority shall also fix and pay the salary of every such inspector and chemical food examiner, and shall have power to dismiss any such inspector or chemical food examiner, and to fill up any vacancy in the office of such inspector or Chemical food examiner occasioned by such dismissal, or by death, resignation, or otherwise.

IV. The General Board of Health shall, within months from the passing of this Act, appoint so many persons, well skilled in Chemistry and Pharmacy, as the said Board, subject to the approval of the Commissioners of her Majesty's Treasury, shall think proper, to be the food analysts of such Board, and there shall be paid to such food analysts such salary or remuneration as shall from time to time be appointed by the said Commissioners of her Majesty's Treasury; and the said Board shall provide and furnish with all necessary implements a proper office in London or Westminster for the use of such food analysts; and the salary or remuneration of such food analysts, and all expenses incurred by the said Board in the execution of this Act, shall be paid out of such monies as shall be provided by Parliament for that purpose.

V. Every person who, by way of trade or for the purpose of sale, shall put into or combine with any article of food or drink, any material calculated to injure the health of persons eating or drinking such article, and every person who shall sell or expose for sale, or have upon any premises belonging to him for the purpose of sale, any article of food or drink into or with which to the knowledge of such person any ingredient or material calculated to injure the health of persons eating or drinking such article has been put or mixed, and every person who shall have upon his

premises any material intended by him to be put into and combined with any article of food or drink, and which if so used would make any such article injurious to the health of persons eating or drinking the same, and every person who shall sell or expose for sale as pure and unadulterated any article of food or drink which to the knowledge of such person is adulterated and not pure, shall for every such offence, on a summary conviction of the same before two justices of the peace, forfeit and pay a penalty not exceeding pounds, nor less than pounds, together with such costs attending such conviction as to the said justices shall seem reasonable, and on the non-payment of such penalty and costs shall be committed to the common gaol or house of correction for any period not exceeding *six* calendar months ; and it shall be lawful for such justices to cause the offender's name, place of abode, and offence to be published in such newspaper or in such other manner as such justices shall deem desirable, and to defray the expense of publishing the same out of the money arising by such penalty, if any, and in default thereof such expense shall be deemed part of the charges and expenses incurred in executing this Act, and shall be defrayed as such by the local authority entrusted with the execution of this Act for the place within which such offence has been committed.

VI. Every person who shall sell or expose for sale, or have upon any premises belonging to him for the purpose of sale, any article of food or drink adulterated contrary to the Act, shall, in the absence of sufficient proof to the contrary, be deemed to have so sold or exposed for sale, or to have so had upon premises belonging to him for the purpose of sale, the said article of food or drink, knowing the same to have been so adulterated.

VII. Every such inspector as aforesaid shall have power at all seasonable times, and with or without assistants, to enter upon any premises within his district wherein any article of food or drink is commonly sold or exposed for sale, and there to search for any article of food or drink intended for sale, as likewise for any material usually mixed with any such article of food or drink, and there to examine and test the same ; and if he shall be satisfied from such examination that any article of food or drink intended for sale which shall be so found there is adulterated with any material which would make it injurious to the health of persons eating or drinking the same, or if he shall be satisfied that any material which he may find on such premises, and which may seem to him to be there for the purpose of being mixed with any such article of food or drink, would if so mixed make such article injurious to the health of persons eating or drinking the same, he shall forthwith seize and carry away and warehouse the same in the warehouse to be provided as hereinbefore mentioned ; and if any such inspector shall not be able to satisfy himself by any such examination whether any article of food or drink which he may so find on such premises be or be not adulterated in manner before mentioned, or whether any material which he may so find there would if so mixed as aforesaid, make any such article of food or drink injurious to the health of persons eating or drinking the same, he shall have power to take there two samples of any such article or material, and one of such samples he shall take away with him, and the other he shall deliver to the person on whose premises the same are so taken, or shall leave it for him with some person having the charge of such premises ; provided, that in every such case such inspector shall take such samples fairly, and shall forthwith after taking the same seal up with an official seal, and otherwise secure each of such samples in such manner as may best prevent it from being fraudulently tampered with, and shall also put upon it a distinguishing mark by which it may be identified.

VIII. One of such samples so sealed up, and secured and marked as aforesaid, shall be delivered by the inspector, taking the same to the chemical food examiner of his district, with a written order, under the hand of such inspector, to examine and analyze such sample, and to certify the result thereof to such inspector ; and such chemical food examiner shall forthwith examine and analyze such sample, and within days from the time of his having received the same, shall deliver or cause to be delivered to the inspector sending the same a certificate, under the hand of such chemical food examiner, which shall state what, according to the knowledge or belief of such examiner, is the quality and nature of such sample considered as an article of food or drink, or as a material to be mixed with any article of food or drink, and particularly whether, in the opinion of such examiner, in cases where it is a sample of an article of food or drink, it be

so adulterated as to be injurious to the health of persons eating or drinking the same, and in cases where it is a sample of a material to be mixed with any article of food or drink it would if so mixed make such article injurious to persons eating or drinking the same ; and such certificate shall refer to the sample to which it applies by its distinguishing mark, and shall, in the absence of any evidence to the contrary, be sufficient evidence before the justices or in any court of justice of the matters therein certified.

IX. Within after any inspector shall have made such seizure of any article of food or drink or material as aforesaid, such inspector shall cause a complaint of an offence against this Act by the owner of any such article or material as aforesaid to be made before a justice of the peace, and thereupon such justice shall issue a summons requiring the owner of the articles or materials so seized as aforesaid to appear before two justices, and to answer such complaint, and such summons shall be served by delivering the same or a true copy thereof upon the premises where such seizure was made ; and if at the time and place appointed it be proved to the satisfaction of such justices that any article of food or drink which had been so seized was adulterated with ingredients which would make it injurious to the health of persons eating or drinking the same, or that any material so seized as aforesaid was intended to be mixed with any article of food or drink for the purpose of sale, and would if so mixed make such article injurious to the health of persons eating or drinking the same, then such justices shall and may, by an order under their hands and seals, adjudge and order such articles of food or drink or such materials to be forfeited to the local authority for the district within which such seizure was made ; and if such justices shall be satisfied that there were no grounds for such complaint, they shall order the articles of food or drink or materials which have been so seized to be returned to the owner thereof, and the inspector seizing the same shall return such accordingly free of all costs or charges to such owner.

X. If any party on the hearing of any complaint by the justices under this Act, shall object to the truth of any matters stated in the certificate of the chemical food examiner, and shall demand that such matters be referred to the food analysts of the Board of Health by way of appeal, it shall be lawful for the justices before whom such complaint is heard, in case they think proper, and the party making such demand shall consent to such terms touching the costs and charges that may thereby be incurred as such justices may deem reasonable, to order such reference to be made, and to adjourn the determination of the complaint accordingly ; and in that case the sample which has been already taken as aforesaid, or such other sample, and to be taken at such time and in such manner as such justices shall appoint, shall be transmitted to the General Board of Health by such justices for examination and analysis by one or more of the said food analysts of the said Board ; and before transmitting the same, and in presence both of the complainant and defendant, the justices so transmitting such sample shall seal with their seal and otherwise secure the same in such manner as shall be considered advisable by such justices, in order to prevent it from being fraudulently tampered with, and shall also put upon such sample a distinguishing mark by which it may be afterwards identified.

XI. The said General Board of Health, so soon as it shall receive any sample transmitted to it according to the provisions of this Act, shall appoint one or more of the food analysts of the said Board to examine and analyze such sample, who shall immediately examine and analyze the same accordingly, and shall, as soon as such examination and analysis have been completed, deliver to the said Board under his or their hand a certificate which shall refer to the sample to which it relates by its distinguishing mark, and shall state what, according to the knowledge or belief of the party so certifying is the quality and nature of any such sample considered as an article of food or drink, or as a material to be mixed with any article of food or drink, in the same manner as the district chemical food examiner is hereinbefore directed to certify with respect to any sample referred to him for examination and analysis ; and such General Board of Health shall thereupon seal such certificate with the seal of the said Board, and shall then forward the same to the justices by whom any such sample was transmitted as aforesaid, free of all fees and charges ; and every such certificate shall be received before the justices or in any court of justice as proof conclusive of all matters therein certified.

XII. All such goods as shall be forfeited under the provisions of this Act shall be dealt with by the local authority as follows ; namely, if any such goods, being articles of food or drink, can by any act or process and at any reasonable expense be

made wholesome as food or drink, the said local authority shall do what may be necessary for causing the same to be so made wholesome, and shall then sell the same, and apply the monies arising from such sale on account of the monies to be raised as above mentioned, for carrying into execution the purposes of this Act; and if any such articles of food or drink cannot by any act or process, or at any reasonable expense, be made wholesome as aforesaid, then such local authority shall cause the same to be destroyed; and as regards any material which may be forfeited on the ground that it was kept by the owner thereof to be mixed with any article of food or drink, and that as so mixed it would make such article of food or drink injurious to the health of persons eating or drinking the same, such local authority shall, if the same materials be commonly used and bought and sold for innoxious purposes, sell the same, and apply the proceeds of such sale in aid of the same monies.

XIII. It shall be lawful for the said General Board of Health from time to time to make such rules and instructions as the said Board may think fit for regulating the use of any material or ingredient which may be mixed with any article of food or drink, and it shall be lawful for such Board from time to time in like manner to revoke and alter any such rules and instructions; and all such rules or instructions, revocations and alterations, shall forthwith, upon the issuing thereof, be published *three* times at the least in the *London Gazette*, and be laid before both Houses of Parliament, if Parliament be then sitting, and if not then within *one month* after the commencement of the then next session of Parliament; and the *London Gazette*, in which rules or instructions, revocations or alterations, were published, shall be deemed sufficient evidence that the same were duly made and published as aforesaid according to this Act, and every person who shall wilfully violate any such rules or instructions, so made and in force for the time being as aforesaid, shall forfeit for every such offence a sum not exceeding pounds; and every inspector shall within his district see to the observance and execution of such rules and instructions.

XIV. No person exercising the trade of selling, or who is concerned or employed in selling or in making and preparing for sale, any article of food or drink, shall be qualified to be an inspector, or food examiner, or analyst, under the provisions of this Act; and any person who shall act as such inspector, or food examiner, or analyst, when he is so disqualified, shall, upon conviction, forfeit a penalty not exceeding pounds for every such offence.

XV. If any inspector shall wilfully be guilty of any extortion or unfairness in the execution of the duties imposed upon him by this Act, or shall take or solicit, either directly or indirectly, any sum of money from any person as a bribe to do, or to omit doing any act or thing which he is empowered or ought to do, under the provisions of this Act, or shall otherwise misconduct himself in the execution of his office, he shall, upon conviction, forfeit and pay a penalty not exceeding pounds for every such offence.

XVI. Every person who shall wilfully obstruct or hinder any inspector in entering, searching, or examining any premises which he is authorized by this Act to enter, search, or examine, or in taking any samples which he is authorized by this Act to take, or in seizing and carrying away any article of food or drink, or any material or materials which he is by this Act authorized to seize and carry away, or generally shall wilfully obstruct or hinder such inspector in the lawful exercise of any powers given to him or duty imposed upon him by this Act, shall for every such offence forfeit a penalty not exceeding pounds.

XVII. In every case where the local authority shall be desirous of having an authoritative judgment as to the quality or nature of any article of food or drink, or of any material suspected to be mixed with any article of food or drink, it shall be lawful for such local authority to transmit to the said General Board of Health any such article of food or drink, or any such material as aforesaid, or any sample thereof, for analysis by the said food analysts of the said Board, and the said Board on receipt thereof shall direct such food analysts, or one or more of them, to examine and analyze the same, who accordingly shall examine and analyze the same, and shall report to the said Board the result of such examination or analysis in a certificate under his or their hand, which certificate shall state all such matters and things as are hereinbefore required to be stated in the certificate which such food analysts are required to give by the eleventh section of this Act, and such certificate shall immediately be forwarded by the said Board to the local authority soliciting the same, and that free of all charge to such local authority.

XVIII. Any person whose goods have been adjudged to be forfeited under this Act, or who has been convicted of any offence punishable by this Act, may appeal to the next general or quarter sessions of the peace which shall be held for the city, county, town, or place wherein such judgment or conviction shall have been made, provided that such person enter into a recognizance within *two* days next after such conviction, with *two* sufficient sureties conditioned to try such appeal, and to be forthcoming to abide the judgment and determination of the justices at such general or quarter sessions, and to pay such costs as shall be by such last-mentioned justices awarded, and the justices before whom such conviction shall be had are hereby empowered and required to take such recognizance, and the justices at such general or quarter sessions are hereby authorized and required to hear and finally determine the matter of every such appeal, and they may, according to their discretion, award such costs to the party appealing or appealed against as they shall think proper.

XIX. If any such conviction, or judgment, or order of forfeiture, shall happen to be made within *six* days before any general or quarter sessions of the peace shall be held for the city, county, town, or place wherein such conviction shall have been made, the person who shall think himself aggrieved by any such conviction may, on entering into a recognizance in manner and for the purposes before directed, be at liberty to appeal either to the then next or next following general or quarter sessions of the peace which shall be held for any such city, county, town, or place wherein any such conviction shall have been made.

XX. If any such appeal shall be made as aforesaid against any such order, or judgment, or forfeiture as aforesaid, the goods to which such judgment or order relates shall, notwithstanding such appeal, remain in the said warehouse wherein they are hereinbefore directed to be lodged, there to await the determination of such appeal; save that if such goods, or any of them, be of a perishable nature, and can by any act or process, and at any reasonable expense, be made wholesome as food, the said local authority shall cause the same to be made so wholesome, and shall then sell the same, and keep the monies arising from such sale to await the determination of such appeal.

XXI. All penalties authorized to be imposed by this Act may be recovered according to the provisions of the Act of the eleventh and twelfth years of the reign of her present Majesty, intituled "An Act to facilitate the performance of the duties of justices of the peace out of sessions within England and Wales with respect to summary convictions and orders;" and all monies arising from penalties under this Act, when paid or recovered, and which are not otherwise directed to be applied by this Act, shall be paid to the local authority entrusted with the execution of this Act for the place within which such penalties may arise, to be applied by such authority in aid of the fund to be raised as before directed for the purposes of this Act.

XXII. No order, judgment, conviction, or proceeding made or had in or relating to the execution of this Act, or touching or concerning any of the matters herein contained, shall be quashed for want of form, or be removed or removable by certiorari or any other writ or process whatsoever into any of the superior courts; and where any distress shall be made for any money to be levied by virtue of this Act the distress itself shall not be deemed unlawful, nor shall any party making the same be deemed a trespasser on account of any defect or want of form in the summons, information, conviction, warrant of distress, or any other proceeding relating thereto, nor shall any such party be deemed a trespasser *ab initio* on account of any irregularity which shall be afterwards committed by him, but all persons aggrieved by such irregularity may recover full satisfaction for the special damage (if any) by an action on the case.

XXIII. No plaintiff shall recover in any action for any irregularity, trespass, or other wrongful proceeding made or committed in the execution of this act, or under any authority hereby given, if tender of sufficient amends shall have been made by or on the behalf of the party who shall have committed such irregularity, trespass, or other wrongful proceeding before such action brought; and in case no tender shall have been made, it shall be lawful for the defendant in any such action, by leave of the court where such action shall depend, at any time before issue joined, to pay into court such sum of money as he shall think fit, whereupon such proceeding, order, and adjudication shall be had and made by such court as in other actions where defendants are allowed to pay money into court.

XXIV. No action, suit, or other proceeding shall be brought against any inspector or other person for anything done or omitted to be done under the provisions of this

Act until one month after a notice in writing has been given to or left for him at his office or usual place of abode, stating the cause of action or complaint, and the name or place of abode of the person intending to bring such action, suit, or other proceeding, and also of his attorney in the cause; and every such action, suit, or other proceeding shall be brought or commenced within six calendar months next after the act or omission complained of, and not afterwards, and the defendant shall be allowed to plead the general issue, and to give this Act and all special matter in evidence under such plea.

XXV. Nothing in this Act contained shall prejudice or derogate from the estates, rights, interests, privileges, franchises, jurisdictions, or authority of the mayor and commonalty and citizens of the city of London, or their successors, or the lord mayor of the said city for the time being, nor prohibit, alter, or diminish any power, authority, or jurisdiction which at the time of the *passing of this Act* the said lord mayor and commonalty and citizens, or the said lord mayor for the time being, possess or lawfully claim by custom, charter, or otherwise, for the regulation, management, and control of markets, or the sale of infected meat.

XXVI. Any stipendiary magistrate shall have full power to do alone whatever two justices of the peace are authorized by this Act to do.

XXVII. In the construction of this Act, the words "articles of food or drink" shall (if not inconsistent with the context or subject matter) include not only all alimentary substances, whether solids or liquids, but also all eatables or drinkables whatsoever not being medical drugs or articles usually taken or sold as medicines.

XXVIII. This Act shall not extend to Scotland or Ireland.

XXIX. This Act shall come into operation on the day of .

REVIEW.

The Elements of Materia Medica and Therapeutics. By Jonathan Pereira, M.D., F.R.S., &c. Fourth edition, enlarged and improved. Vol. II., Part II.

At the period of the lamented death of the author of this work the third edition was in course of publication, and the last part, corresponding with the volume now under notice, was edited by Drs. A. S. Taylor and G. O. Rees.

That edition has already been exhausted, and a new one appears, for which we are indebted to the zeal and industry of the same editors. That their labours on the previous edition have been approved may be inferred from the fact that a large impression has been sold within three years. On looking over this volume it is evident that the duty undertaken by the editors has been no sinecure, as about one hundred pages of matter, including many new subjects, have been added. The articles on "Chloroform" and "Cod-liver Oil" have been rewritten, and notices inserted of amylene, pepsine, and many other medicinal agents which have been recently introduced into medical practice, or which it was thought desirable to include in this very comprehensive work. We highly approve of the method adopted by the editors of distinguishing the new matter introduced by them by enclosing it within brackets, for, although much judgment appears to have been exercised in the selection of such matter, most readers will be anxious to have the means of referring the descriptions given to their respective authors. The present edition of the work is in three volumes, the second and third of which comprise those articles of the Materia Medica which are derived from the animal and vegetable kingdoms. Each of the three volumes has a separate index, an arrangement which, in some respects, will be found advantageous.

Although this work, in the state in which it was left by the original author, was undoubtedly the best and most complete treatise on Materia Medica extant, yet so many changes are constantly occurring in the practice of medicine and in the state of our knowledge of medicinal agents, that an important duty necessarily devolves upon the editors in making such alterations as shall ensure to the work a continuance of the high reputation it has hitherto enjoyed. The manner in which this duty has been performed in preparing the present edition, affords satisfactory evidence of the qualifications of the editors for their difficult task. The promptness with which the demand for this edition has been responded to deserves especial acknowledgment.

BOOKS RECEIVED.

THE DRUGGIST'S GENERAL RECEIPT BOOK; *comprising a copious Veterinary Formulary; numerous Recipes in Patent and Proprietary Medicines; Druggists' Nostrums, &c.; Perfumery and Cosmetics; Trade Chemicals, Scientific Processes, and an Appendix of useful Tables.* By HENRY BEASLEY. Fourth edition. London: John Churchill, New Burlington Street, 1857. (From the Publisher.)

THE GYMNASTIC POLYMACHINON; *Instructions for performing a Systematic series of Exercises on the Gymnastic and Calisthenic Polymachinon.* By CAPTAIN CHIASSO, Professor of Gymnastics at University College School, &c. &c. London: Walton and Maberly, Upper Gower Street. Paris and New York: H. Baillière, 1855. (From the Author.)

A FEW WORDS ABOUT POISONS, *chiefly with reference to Present Difficulties.* By a PHARMACEUTIST. London: H. Baillière, Regent Street and New York.

ANNUAL REPORT OF THE COMMISSIONERS OF EMIGRATION OF THE STATE OF NEW YORK, *with the Medical and Surgical Reports for the Year ending December* 31, 1856. New York: W. C. Bryant and Co., 1857.

TO CORRESPONDENTS.

THE GENERAL INDEX OF THE FIRST FIFTEEN VOLUMES OF THIS JOURNAL IS READY FOR PRINTING.—For terms and particulars see the cover of this number.

N.B.—Early attention is requested, as the price of the Index, will depend on the number printed, and the subscription list will be open during the present month (August).

Testimonial to Professor Sands Cox.—We have received from a correspondent a notice of the presentation of a testimonial to Mr. Sands Cox from the ladies of Birmingham. It consists of an escritoire with silver fittings, and a costly achromatic microscope. The amount of subscription to the general testimonial now exceeds £1200.

Spes (Stockport).—*Donovan's Syrup of Bark*, vol. iv., page 155.

J. (Mornington-place).—(1.) An apprentice need not complete the term of apprenticeship before he can pass the Minor Examination.—(2.) Jalapine is insoluble in water; it might be suspended in the mixture alluded to by the addition of mucilage.

F. W. (Hammersmith).—*Fly poison.* We cannot recommend anything safer than a strong infusion of quassia sweetened.

R. J. (Aberdare)—*A Student* (Cambridge)—*P. O.*—*The Examinations.* See vol. xii., page 314, and page 116 of the present number.

A. P. S. (Cheshire).—Mix the iodine with the oil, and apply a gentle heat.

L. M. S. (Lincoln).—We are unable to give the information required.

J. K. (London).—The postage of this Journal to the United States, if not exceeding three ounces, is 6*d.*; if three ounces, and not exceeding four ounces, 8*d.*; with the addition of 2*d.* for every additional ounce in weight.

T. B. (Sutton) suggests that the restrictions on the sale of poisons should not apply to the sale of quantities insufficient to cause death.—[This would go a very little way towards meeting the difficulty. It would not permit the sale of mixtures containing more than one dose.]

Mr. Hodgson, of Stockton, has sent us a portion of a register of the sales of opium and laudanum during a fortnight, which he intends to complete for the month, when we shall be glad to receive the other portion.

An article on "Chinese Botany," by Dr. Lotsky, has been received.

W. H. H. (Newark).—The directions referred to in the Pharmacopœia are certainly not explicit. What is intended is, that, in using carbonate of soda for estimating the quantity of free acid contained in a solution, after adding the carbonate, the carbonic acid which is set free must be expelled from the solution by the application of heat, before applying litmus or turmeric.

Instructions from Members and Associates, respecting the transmission o the Journal, to the Secretary, 17, Bloomsbury Square, before the 20th o the month.

Advertisements (not later than the 23rd) to Mr. CHURCHILL, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XVII.—No. III.—SEPTEMBER 1st, 1857.

THE PRIZES OFFERED BY THE COUNCIL OF THE PHARMACEUTICAL SOCIETY.

The Annual Distribution of the Prizes in the Classes of Chemistry and Pharmacy, and Botany and the Natural History of Drugs, will take place at the Pharmaceutical Meeting to be held on Wednesday evening, the 7th of October. These periodical competitions have a practically-useful effect, which, however, would be more generally felt, if the object of this stimulus to industry were understood and appreciated. The most valuable prize is the knowledge acquired during the competition, and of this the medal is only the indication. It sometimes happens that, at the commencement of a session, a Student is observed to enter upon his labours with unmistakable earnestness. He is at his post early in the morning and late at night. He never misses a lecture, nor loiters about afterwards, but retires to the library, to revise his notes and fix the subject-matter on his memory. He indulges himself with very little recreation, for his mind is occupied with the pursuit of knowledge, in which he feels an interest—in the first instance arising from emulation, but afterwards from an acquired taste for science on its own account. Among his fellow-students he obtains the reputation of being "a prize man,"—and such an example is worthy of imitation. But unfortunately, from a mistaken idea as to the object of competition for prizes, the excessive industry of one Student is found sometimes rather to discourage others, who, not having the perseverance, or perhaps the time, to do likewise, despair of success, and abstain altogether from the contest. It is supposed by some persons that it is more honourable not to try, than to try and not to win; but they forget that all gain their share of knowledge, though only one carries off the prize.

The Pereira Medal was offered last year by the Council for the best Essay on the Development and Structure of the Starch Granules. This is a subject on which our late Professor, Dr. Pereira, was much interested; it furnishes a good opportunity of exemplifying the practical utility of the microscope, and has reference to the means of detecting the adulteration of many articles of food. It was expected that there would have been a rather extensive competition for this prize, which, however, has not been the case.

The Silver Council Medal, which was offered last year for the best Herbarium of Preserved Indigenous Plants, was intended as a means of directing the attention of Students to the subject of Botany, which has hitherto been too much neglected among Pharmaceutists in this country. There are six competitors on the present occasion. The offer of a medal on the same conditions being renewed for next year, we hope the number of candidates will be greater.

A Silver Council Medal was offered last year for an Essay on the Preparation of Cerates, Ointments, and Plaisters: comprising the result of the experimental investigations of the processes of manufacture, liability to deterioration, &c.; a full description of the defects which occur in the cerates, ointments, and plaisters in the three British Pharmacopœias; a notice of any peculiarities in the formulæ for similar preparations contained in Foreign Pharmacopœias; and suggestions for improved formulæ.

The proposal to offer this prize originated with the Pharmacopœia Committee. In revising this class of substances, it was thought that the subject presented a wide field for research and experiment. This would require a considerable

sacrifice of time, and some pecuniary outlay; but the Council thought the importance of the subject, and the honour of contributing towards the improvement of some of the processes in the Pharmacopœia, would have afforded a sufficient stimulus to enter upon the undertaking. No Candidate, however, has competed for this prize. The Council will, therefore, have to consider at the next meeting whether the offer should be withdrawn, or renewed with an extension of time. Arrangements will also be made on the same occasion for the adjudication of the other prizes, of which due notice will be given.

THE MEDICINE STAMP AND LICENCE ACTS.

N.B.—The payment for renewal of the Patent Medicine Licence is due on the first of September.

Notwithstanding the repeated precautions which have been published in this Journal, with explanations of the provisions of the Acts of Parliament, a considerable number of cases have been lately reported to us, in which the usual circular from Mr. Timm has been received. It is a remarkable circumstance, that in a large proportion of these cases, the delinquency consists in selling Gregory's powder or essence of ginger without a stamp, these being the preparations selected as instances, and fully explained in the article on the subject in our number for October, 1854, vol. xiv., page 146, and in several previous numbers.

It appears to be forgotten or overlooked that whenever any medicine or preparation is recommended by the vendor for the relief or cure of any disorder, it requires a stamp. Several of our correspondents have appealed to us, enclosing Mr. Timm's letter and a copy of the label, in which the allusion to any disorder is carefully omitted; but, upon application at the Stamp Department, Somerset House, we find that the recommendation is contained in a paper wrapped round the bottle, or given away separately across the counter, as a means of inducing customers to purchase the medicine. This latter mode of proceeding is in principle the same as that of recommending the medicine in plain terms on the label. It is, in fact, by the authorities, held to be even more objectionable, as it is considered an intentional evasion, which is worse than an accidental oversight. It is not our business at the present time to discuss the merits of the law, whether a wise and just one, or the reverse. We have only to observe that so long as the law continues in force, it is proper to comply with the terms and conditions imposed, and we therefore recommend our readers to pay particular attention to the provisions of the Act as above explained.

THE FURTHER PROGRESS OF THE SALE OF POISONS BILL.

The second edition of this Bill as altered, or, in Parliamentary language, "as proposed to be amended," has been presented by the Committee to the House of Lords, and is printed for the consideration of the public during the recess.

The new portions of the Bill, with a digest of the alterations and the needful explanations, would have occupied nearly as much space as the Bill itself, which we therefore publish entire, printing in italics the new clauses and verbal additions which have been introduced in Committee. On comparing the second edition with the Bill as printed in our number for June, it will be seen that the principal omissions are the following:—The latter part of the 3rd section (1st edition); the whole of the 4th (relating to the power of adding other poisons to the schedule); the latter part of the 5th section; part of the 6th; all the 7th;

the words "in quantities of not less than half a pound," in the 8th; the latter part of the 11th section; some portions of the 13th; about half the items in schedule A; the whole of schedule B; and a few words in the remaining schedule.

To those who are practically conversant with the subject it will be obvious, after a few moments' consideration of the alterations, that the last state of the Bill is worse than the first. The Bill, as originally drawn, would have been simply impracticable, and therefore inoperative. It would, in the first instance, have caused some inconvenience, but by degrees it would have become—like the Ecclesiastical Titles Act—a dead letter, defied and disregarded by those whom it was intended to restrain, and merely serving to expose the impotence of legislators when they get out of their depth. In the Bill as altered, the intended precautionary provisions are considerably impaired, and while there is a pretence of adopting the suggestions offered to the Committee in regard to the qualifications of persons dealing in poisons, it is proposed to attain this object by annihilating the legitimate source of Pharmaceutical improvement, and substituting a superficial examination, to be performed by a mixed Board, consisting of six persons, under four independent jurisdictions, remunerated according to the number of candidates, and invested with irresponsible and inquisitorial powers.

In briefly noticing the several precautions—real or imaginary—retained in the Bill, it is proper to bear in mind the object in view—namely, the protection of the public against the risk of poisoning, whether *accidental*, *criminal*, or arising from *ignorance*.

The primary prevention against accident consists in the seclusion of certain substances comprised in an arbitrary schedule under the definition of "poisons," which are to be kept separate from other substances assumed by the Act, *à fortiori*, to be harmless. That some discretion is requisite in the arrangement of the various materials in a Druggist's shop will not be denied, and this is attended to in every well-conducted establishment, according to the nature of the business and the relative demand for different medicines. But the absurdity of attempting to regulate these matters of detail by Act of Parliament will at once be apparent, if we place in juxtaposition a selection from the contents of the poison-closet, and from the medicines not recognized as poisons, and therefore arranged promiscuously in the shop:—

In the Poison Closet.	*In the other parts of the Shop.*
Arsenic and its compounds	Carbonate of Baryta—Chloride of Barium and its solution—Soda—Magnesia—Potash—Elaterium—Jalap—Croton Oil—Castor Oil—Iodine—Phosphorus—Nitrate of Silver—Sulphur—Chloride of Zinc—Cyanides of Zinc and Mercury—Cherry Laurel Water—Tobacco and its preparations—Tinctures of Senna, Rhubarb, Colchicum, Digitalis, Ginger, Henbane, Hellebore, Hemlock, &c.—Cream of Tartar—Poppies, Extract or Syrup—Indian Hemp—Decoction of Aloes—Nitre—Sugar of Lead—Carbonate of Lead—Amyline—Quinine—Euphorbium—Lavender—Antimonial Wine—Ipecacuanha—Oil of Vitriol—Olive Oil—Nutmegs—Calumbo—Gentian—Ergot of Rye—Soap—Savin—Rue—Roses—Calomel—Sulphate of Copper—Tamarinds, &c. &c. &c.
Corrosive Sublimate and its solution	
The poisonous Vegetable Alkaloids and their salts	
Prussic Acid	
Cyanides of Potassium	
Essential Oil of Bitter Almonds, or any mixture containing it	
Cantharides	
Aconite and its preparations	
Opium, Crude, or in Tincture, Extract, or Powder	
Oxalic Acid and Salt of Sorrel	
Chloroform	
Nux Vomica	
Tartarized Antimony and its solution	
Cocculus Indicus	

It may appear that the list of drugs, &c., in the right-hand column is a

"chance medley." It is so. The passing of such an Act of Parliament would imply that the Pharmaceutical Chemist is incompetent to arrange the materials in his shop. The six Examiners are therefore empowered to search his premises, to ascertain whether he keeps the poisons (in the left-hand column) apart by themselves. As for the other drugs, they are not poisons according to the Act, and are therefore subject to no precautions or inspection.

For what purpose poisons are to be wrapped in tinfoil or gutta percha we have never been informed, nor have we seen any attempt to point out the object of this provision.

With regard to the angular bottles, we need scarcely add anything to what has been already said, the substance of which is briefly illustrated in the following answer to a question by the Chairman of the Committee, who noticed the fact that the regulation would not be applicable to the case of medical prescriptions, and would therefore not inconvenience dispensary patients.

"*Ans.* 180. Assuming that the public have been taught by the Act that a square bottle is dangerous and that a round bottle is safe, the patient goes to the dispensary with a round bottle, he not having a square one, and his lotion is put into it; he has been taught by the Act that anything in a round bottle is safe to drink, and he goes home and drinks his lotion."

The object of colouring poisons with soot, indigo, or archil is chiefly as a precaution against criminal poisoning; but it is provided that, where the poison is stated by the purchaser to be required for some lawful purpose for which such admixture would, according to the representation of such purchaser, render it unfit, such poison may be sold without such admixture. For example: a person wants arsenic to poison his wife; he states that he requires it to poison a rat, for which purpose, *according to the representation of such purchaser*, the admixture would render it unfit, the rat being a remarkably sly one. Accordingly he obtains it without such admixture; and thus in the only cases in which the admixture might have been of any service, the law is evaded by a falsehood, at which a murderer would not be likely to scruple.

It will therefore be obvious, that, as a protection to the public, this proposed Act would be ineffectual, the precautions being either futile or capable of easy evasion. It only remains for us to point out what would be the operation of the Act in reference to the most important of all precautions,—namely, the improved qualification and intelligence of those who deal in and dispense medicine.

The Pharmaceutical Society has been engaged during above sixteen years in the endeavour to bring about such improvement, and the value of its services in this undertaking are generally acknowledged. While the Medical Profession has been convulsed with party disputes, and the contending claims of rival Examining Boards bidding against each other in the struggle for candidates, and involving in confusion every scheme for medical reform, the Pharmaceutical body, represented by a voluntary association, has been steadily and peaceably progressing in the task of introducing a qualification in Pharmacy such as the safety of the public and the credit of the profession require. The Committee of the House of Lords having officially communicated with the Council of the Pharmaceutical Society on the Sale of Poisons Bill, and evidence having been taken on the subject, whatever may be the difference of opinion on minor points, the testimony of all parties concurs in one particular, namely, that the public "would be in a better position by having a competent class of dealers than by very close restrictions regarding the keeping of the poisons."* The Pharmaceutical Society having been the pioneer in this movement, and having been for many years engaged in it before the Legislature or the public could be induced to pay any attention to the subject, it might have been supposed that it would scarcely be necessary to go about in search of some new authority or machinery

* Evidence of Dr. A. S. Taylor.

to supersede an Institution specially constituted and adapted for the purpose in view. Such, however, is the case. Not only is the Society ignored as an examining body, but its Members are not even recognized as competent to deal in poisons. They must, in common with other persons who sell drugs, come up to the "Government Examining Board" for a licence to carry on their business; they must pay the fee and be subject to the visitation and control of the Examiners in reference to the custody of poisons in their shops.

The Pharmaceutical Society being a voluntary Association, reinforced through the medium of its Examinations, and dependent on the estimation in which its diploma is held by the profession and the public, it requires no great amount of penetration to calculate the mode in which the proposed system of licensing would operate. The parents of a youth about to be brought up to the business of a Chemist, have before them two courses for selection. If they decide that he is to be a Member of the Pharmaceutical Society, he must undergo a rather expensive education, pass a proportionally strict examination, paying a fee of ten guineas, and enjoying the status of Pharmaceutical Chemist, with the privilege of Membership on payment of a further fee of five guineas. But this does not entitle him to deal in poisons.

The other alternative consists in obtaining a licence from the Board of Examiners under the Sale of Poisons Act. The examination in this case is, and must of necessity be, a very lenient one. It will entail but little expense in acquiring the needful education. A further saving will be effected in the fee on examination. The amount suggested is, we understand, forty shillings for a licence, renewable in five years on the same terms. Then the Board enjoys nominally the weight of the Government, the prestige of the Royal College of Physicians, the Society of Apothecaries, and the Pharmaceutical Society. Moreover, the possessor of the licence may deal in poisons, and being a licentiate of the Government Board, would naturally look down upon the members of a voluntary Society, on whom the Legislature confers no privilege, except that of a name. Under these circumstances, it could scarcely be expected that parents and guardians would elect the more expensive and difficult ordeal for their sons to pass through, with neither honour nor emolument attached to it, while at very moderate expense, and little trouble, they may acquire the Government diploma, with the privilege of dealing in poisons. While the Pharmaceutical Society would thus be practically superseded, the new examination, as a substitute for the present one, would be a delusion and a snare. If it were otherwise, it would not be adapted to the class of persons who, by the provisions of the Act, are compelled to obtain the licence—namely, all persons who deal in any of the substances comprised in the schedule of poisons.

On observing in the Poison Bill this ingenious contrivance for undermining the Pharmaceutical Society, by diverting the tide of its influence into another channel, it became a matter of curiosity to ascertain to whom is due the credit of the invention; and on reference to the Report of the Select Committee on the Bill, we find the following evidence of Alfred Swaine Taylor, M.D., F.R.S.:—

"*Chairman.*—What, in your opinion, would be the best constitution of a Council to superintend the granting of these licences?

"A Council formed, say of one or two members of the Royal College of Physicians in each country, and of the Pharmaceutical Society, or of the Apothecaries' Society; at any rate I would have on the Board five or six men, some acquainted with drugs as well as some acquainted with medicines and their properties; I think, then, that there would be great security in having men of skill and knowledge upon the Board, and in that there would be a very great provision for the safety of the public in reference to the dispensing of drugs.

"Have you any knowledge of the existence of any amount of jealousy between those bodies?

"There is, I believe, a great jealousy among them. The Apothecaries' Society and the Pharmaceutical Society are very much opposed. The Apothecaries' Society rather invade the Pharmaceutical Society's privileges, by the fact that there are

some 8000 or 9000 men now in this country licensed by the Apothecaries' Society who act as Druggists, and sell drugs, as well as practise medicine. Then there are a great number of Pharmaceutists, without any medical certificate at all, who prescribe for patients; and it is a great difficulty in this country that we have one body, quite incompetent to prescribe, invading the privileges of another without any examination; while the one who is competent is invading the business of the other, and that creates a conflict of feeling.

"*Lord Rossie.*—You think that a body might be selected as an examining body?

"I think so.

"*Chairman.*—Would you recommend that that body should be constituted in the Bill at once, or would you think it better that it should be left to any authority?

"My opinion is clearly this, with regard to suppressing or restricting the sale of poison, that society would be in a better position by having a competent class of dealers, than by very close restrictions regarding the keeping of the poisons.

"Admitting that; supposing the Committee were of opinion that it were desirable for the future to have an examination by a public body, do you think that the examining body should be constituted by the Bill?

"I have thought with regard to that that a large body need not be selected; that four or five men should be taken from the College of Physicians and the Society of Apothecaries; whether your Lordships would think that the Pharmaceutical Society occupy such a position that they should furnish Members or not, of course it is not for me to say; but they have not yet the educational position that the College of Physicians and the Apothecaries' Society possess.

"*Lord Rossie.*—Are there any other Societies besides the Apothecaries' Society and the Pharmaceutical Society?

"Not with reference to the sale of poisons or medicines.

"So that if you selected from each of those two bodies, you might get rid of any jealousy which exists between them?

"Yes. The Pharmaceutical Society has done a great deal for improving the status of the Druggist. Whether there are not one or two members of that Society who, from their experience, would be proper persons to add to the Board of Apothecaries and Physicians, is a question for your Lordships."

This evidence requires no comment.

Professor Brande, in answer to some leading questions, falls into the same notion about the supposed jealousy and the possibility of combining the elements:—

"686. *Chairman.*—Assuming that no person is to be allowed to carry on the business of selling these poisons who has not passed an examination, and obtained a licence to carry on that business, to what body would you entrust the responsibility of granting or witholding that licence?

"I think there are several bodies who would be adequate examiners in such a case: there is the College of Physicians, the College of Surgeons, the Apothecaries' Company, the Pharmaceutical Society, and I think some others.

"687. Would there be any jealousy on the part of any one of those bodies if they were excluded?

"I think there would.

"688. Would it be possible to combine all four?

"I think it might."

The nature of the jealousy between the several bodies referred to is here erroneously represented. Between individuals having shops in the same street or locality, there may be a certain amount of jealousy in some instances, but the Society of Apothecaries and the Pharmaceutical Society neither interfere nor desire to interfere with each other. The Members of the Society of Apothecaries are qualified Medical Practitioners, and therefore entitled to the privilege of dealing in poisons. The Members of the Pharmaceutical Society are also acquainted with the nature and properties of drugs, and equally entitled to exemption from the restrictions proposed by the Poison Bill for unqualified persons. Prior to the passing of the Apothecaries Act in 1815, the College of Physicians declined the honour and responsibility of examining the Apothecaries.

In 1841, about the time of the establishment of the Pharmaceutical Society, the College also declined to undertake the examination of the Chemists. Consequently the Society of Apothecaries and the Pharmaceutical Society were severally *compelled* to make provision for the examination of the Members of their own body. These examinations are conducted independently and without any jealousy or disagreement on either side.

It is to be regretted that any reciprocal encroachment takes place between the Members individually; but this is not officially encouraged, and the maintenance of harmony and order will be best secured by the separation, as much as possible, of the Medical from the Pharmaceutical functions.

The problem to be solved is a very simple one. We have four distinct bodies, the Colleges of Physicians and Surgeons, who have declined to interfere with the examination of Apothecaries or Chemists; the Apothecaries and the Pharmaceutical Chemists, who have each a separate provision for the examination of their own Members. It is proposed to institute an examination for a numerous class of persons who deal in drugs, but who are not competent to pass the examination as Pharmaceutical Chemists. By whom should this examination be conducted? Is it to be a medical or a pharmaceutical examination? If medical, let it be entrusted to the Apothecaries, if pharmaceutical, why should a new Board of Examiners be constituted when there is one already sanctioned by Act of Parliament?

The most sweeping amendment in the Bill is the 20th section: "This Act shall extend only to England."

The entire question is adjourned until next session. In the mean time we shall have an opportunity of further considering it; and having pointed out some of the impracticabilities of the present Bill, we intend in a future number to make a few suggestions as to the best mode of dealing with this intricate and difficult question. At all events, if it be possible to frame a Bill suitable for England, there can be no reason why the other portions of the kingdom should be deprived of the benefit.

Although we strongly object to some of the provisions of the proposed Poison Bill, for reasons briefly stated above, it cannot justly be imputed to us that we are at all disposed to throw needless obstacles in the way of legislation on the subject. On the contrary, our frequent allusion to it, with reports of cases, was noticed by Mr. Calvert in his evidence before the committee, as follows:

"555. Do you think that, in France, the strictness of the law has prevented poisoning?

"There is not a doubt of it in my mind. I can give the reason why I draw this conclusion. I read a great number of scientific books from France and Germany, and books published in England. If you compare the number of cases of poisoning which come under notice in reading, it is very rare that you see any case recorded in the scientific French books. In our English books it is repeatedly the case. If you take the *Pharmaceutical Journal*, a well-known publication in England, you will find such cases there recorded very often. I should say that in every number there are some cases of poisoning, either by one kind of substance or by another kind of substance. If you take the *Journal de Pharmacie*, which is a journal exactly similar, it is seldom that you find a case of poisoning there recorded."

The inference here drawn by Mr. Calvert is not strictly correct. In France, the Government takes upon itself the responsibility of regulating medicine and pharmacy, and the laws are already sufficiently stringent: the interference of the press, therefore, with a view of promoting amendments, is unnecessary. In this country, the Government pays little or no attention to these subjects, unless goaded into a sense of their importance by the vigilance and constant appeals of the press: it is with this especial object that we publish from time to time cases of poisoning as they occur, with such particulars as may serve to indicate the the kind of precautions most likely to be effectual.

TRANSACTIONS

OF

THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *August 3rd,*

Present—Messrs. Bell, Bird, Bucklee, Davenport, Deane, J. B. Edwards, G. Edwards, Hanbury, Keeling, Macfarlane, Meggeson, Moore, Peacock, Squire, Waugh, and Woolley, the following were elected

MEMBERS.

LONDON .....Butt, Edward Northway
" .....Lawrence, Henry
" .....Tibbs, Frederick

MAJOR EXAMINATION, *August* 18.

Andrew Leyshon .....Swansea
Lee, John William.....Liverpool
Long, Henry .....London

MINOR EXAMINATION.

Avice, Ernest .....Mauritius
Essery, William .....Plymouth

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	TOWNS.
Iliffe, Frank	Mr. Brown	Coventry
Murrell, John Friday	Mr. Maynard	Brandon
Orton, Thomas Johnson	Mr. Iliffe	Nuneaton
Scott, James Furness	Mr. Smith	Dunstable

BOTANICAL PRIZE.

Resolved, "That the Botanical Prize be offered for the ensuing year on the same terms and conditions as the last; from August 1st, 1857, to August 1st, 1858."

The Terms and Conditions are as follows:

The collections to consist of Phanerogamous plants and ferns, arranged according to the natural system of De Candolle, or any other natural method in common use, and to be accompanied by lists arranged according to the same method, with the species numbered.

The collector to follow some work on British Botany (such as that of Babington, or Hooker and Arnott), and to state the work which he adopts. The name of each plant, its habitat, and the date of collection, to be stated on the paper on which it is preserved.

Each collection to be accompanied by a note containing a declaration, signed by the collector, to the following effect:—"The plants which accompany this note were collected by myself between the first day of May, 1857, and the first day of August, 1858, and were named and arranged without any assistance but that derived from books."

In estimating the merits of the collections, not only will the number of species be taken into account, but also their rarity or otherwise, and the manner in which they are preserved, and should a specimen be wrongly named, this will at once be erased from the list.

The collections to be forwarded to the Secretary of the Society, 17, Bloomsbury Square, on or before the first day of August, 1858, endorsed "Herbarium for Competition for the Botanical Prize."

If required, the collections will be returned after competition, with the exception of that of the successful competitor for the silver medal, which will be added to the herbarium of the Society.

No candidate will be allowed to compete unless he be an Associate, Registered Apprentice, or Student of the Society, or if his age exceed twenty-one years.

ORIGINAL AND EXTRACTED ARTICLES.

SOME NOTES ON THE MANUFACTURES OF GRASSE AND CANNES.

BY DANIEL HANBURY.

That portion of the South of France which borders the Mediterranean between Toulon and Nice, is noted for its mild, salubrious climate, and also for the growth and manufacture of several productions of interest to the Druggist and the Perfumer.

A recent visit to the district in question, and especially to the towns of Grasse and Cannes, having given me the opportunity of seeing something of the manufactures there carried on, I have thought that a few lines on the subject might prove acceptable to the English readers of the *Pharmaceutical Journal;* let it be remembered they are but the notes of a passing stranger, and as such not to be taken for more than they are worth.

Grasse is a town of some 13,000 inhabitants, lying at the foot of a range of mountains, and open to the Mediterranean, from which it is distant about eight or nine miles. The olive is cultivated in great abundance in all the adjacent country, and grows far more luxuriantly than in many other olive districts of the South of France. The mildness of the climate is still more manifested by the orange trees, which, with here and there a date-palm, form a striking ornament of the little town gardens of Grasse. The other plants that are cultivated are the Rose, the Jessamine (*Jasminum grandiflorum* L.), Mignonette (*Reseda odorata* L.), and Tuberose (*Polianthes tuberosa* L.).

Cannes, a small town situated on the shore of the Mediterranean, about ten miles from Grasse, enjoys a climate still more favoured. The orange is cultivated more extensively; the rose, jessamine, and other plants under culture at Grasse are likewise grown on a large scale at Cannes; and in addition we find the Geranium (*Pelargonium Radula* Ait., var. β *roseum*) and Cassie (*Acacia Farnesiana* Willd.), the latter in considerable abundance.

Two species of orange are cultivated about Grasse and Cannes, one known as the *Bitter Orange* or *Bigaradier,* the more esteemed and more extensively grown, the other as the *Sweet* or *Portugal Orange.*

Orange-trees are grown in all the country in the neighbourhood of Grasse, but especially in places in the vicinity of the coast. When the season arrives, the flowers are collected by itinerant agents called *Commissionaires*, who bring them from the growers to the distillers, their remuneration being the small commission of one *sou* per *kilogramme*, or about $\frac{1}{4}d.$ per lb.

The finest Neroli and finest Orange Flower Water are distilled from the flowers of the Bigaradier. Inferior Neroli, not worth more than half the price of the finest, is yielded by the flowers of the Sweet or Portugal Orange. The Essential oil called *Essence de Petit Grain* is distilled from the leaves of the Bigaradier: the distilled water mixed with that of the flowers, is sold as an inferior quality of Orange Flower Water.

Roses are cultivated close to the town of Grasse, as well as in all the country adjacent, often on a very small scale and in situations apparently very arid. In the month of May the flowers are collected daily, and brought by the growers to the manufactories for sale.

The Rose Water of Provence is of very superior quality: essential oil or Otto of Rose is separated from it after distillation. This otto differs from the Turkish, even from the purest specimens, in remaining congealed at a much higher temperature. In the market it commands a far higher price than the Turkish Otto, being worth from 1800 to 2000 francs the *kilogramme.** It is but little in demand, and the supply is comparatively small.

* Equal to (say) 41*s.* to 45*s.* per oz.

The Jessamine, which is cultivated upon an extensive scale, is *Jasminum grandiflorum* L., a species with large white, exceedingly fragrant flowers. The plants are all grafted upon stocks of *Jasminum officinale* L.: they are planted close together in rows, and are not allowed to attain a height of more than about two feet. They are kept of this low stature in order to facilitate their protection from cold, which is effected by heaping the earth completely over their stems at the commencement of winter. Jessamine flowers are in season in July and August: they are chiefly employed to communicate their odour to oils and pomades. Jessamine water was shown to me by one manufacturer.

The *Cassie*, *Acacia Farnesiana* Willd., is cultivated chiefly about Cannes, where it is to be seen forming a bush or small tree. Its flowers, which are very fragrant, are used in perfuming oil and pomade: they are produced in September, and are worth five to six francs the *kilogramme*.

The Geranium is cultivated for the purpose of obtaining its essential oil. The Tuberose is grown at Cannes as well as at Grasse, its deliciously fragrant flowers being used, like those of the *Cassie*, for scenting oil and pomade.

The establishments where the distillation of essences and waters, and the manufacture of other articles of perfumery are carried on, are many of them of considerable extent, and kept up in a style of great completeness. The stills are of copper, and heated by a naked fire; they are mostly, if not all, of small size, compared with the great stills used in this country. Their small capacity is, however, compensated by their numbers, some manufacturers having a dozen and others twice that number. In one operation which I saw in progress, the charge of the still with leaves of the Bigarade Orange was about 80 lbs.

In addition to the manufacture of essential oils, an important branch of industry consists in the preparation of scented fatty oils and pomades. These are prepared by one of two proccsses, called respectively *Infusion* and *Enfleurage*.

Infusion consists, as the name implies, in infusing the substance whose odour is to be extracted, in a mixture of lard and beef-fat melted in a water-bath, or in warm olive oil. The chief substances thus treated are the flowers of the Rose, Cassie, Bitter Orange, and Violet. Mignonette is also sometimes subjected to this process. The flowers are immersed entire, except in the case of Orange Flowers, which are previously bruised. After immersion in the fatty menstruum for a requisite period, the mixture is strained off and the residue pressed. The pomade is preserved in large metal vessels, some of which have a capacity of 300 *kilogrammes*.

The process of *Enfleurage* is resorted to in extracting the odour of the flowers of Tuberose, Jessamine, and Mignonette. The apparatus required is merely a number of shallow wooden frames of about 18 by 15 inches, enclosing at half their depth a sheet of glass. The edges of the frames rise about an inch above each surface of the glass, and being flat, the frames stand securely one upon another, forming often considerable stacks. The technical name for the frames is *Chassis:* those just described are called *Chassis aux vitres*, or *Chassis aux pommades*, to distinguish them from a different form, which is used where oil has to be submitted to the process of *Enfleurage*. The process in the case of pomade is thus conducted: the unscented fat (which has about the consistence of spermaceti ointment), is weighed into portions, each sufficient for one side of the sheet of glass of a *chassis*. It is then spread over the glass with a spatula in a layer hardly a tenth of an inch thick, care being taken by employing a little inner frame during the spreading, that the fat does not come in contact with the woodwork of the *chassis*. One surface of the glass having been thus coated, the other is coated in like manner; and the *chassis* is ready to receive the flowers. These are now thinly sprinkled, or rather laid one by one, upon the surface of the fat, where they are allowed to remain until the next day or day after, when they are removed and fresh flowers supplied. The *chassis*, charged with fat and flowers,

are stacked one upon the other, forming in fact a number of little rectangular chambers, the upper and lower surfaces of each of which, are of glass covered with a thin layer of fat sprinkled with flowers, the sides being of wood. In one manufactory which I inspected, only one surface of each *chassis* was coated with fat, the jessamine flowers being placed in an abundant layer upon the other surface: in another establishment, flowers of mignonette were being similarly treated. In this arrangement the flowers do not, of course, come in contact with the fat, but the latter is simply suspended above them to receive and absorb their odour. The flowers require changing either daily or every other day for forty or fifty days before the pomade is sufficiently impregnated with their odour. It is essential that all flowers employed in this process should be collected during dry weather.

When oil has to be impregnated with the odour of flowers, a *chassis* is used which is of larger size, and has a diaphragm of coarse wirework instead of glass. Upon this diaphragm is laid a cotton cloth of a peculiar, thick, absorbent texture, soaked with oil; flowers are then spread upon it, and renewed daily until the requisite odour has been obtained. The oil is then pressed from the cloth and filtered: each cloth imbibes about 2 lbs. of oil.

The preparations called by the perfumers *Extracts* are made by treating the highly-scented oil or pomade with spirit of wine, so as to dissolve out the essential oil which either may have absorbed from the flowers with which it has been placed. This process is more usually conducted by the general perfumer than by the distiller and manufacturer of Grasse or Cannes, the business of the latter being more particularly with what he terms the *matières premières*. The pomade or oil, after having yielded to spirit the greater portion of its odour, is yet valuable for other purposes to which the manufacturing perfumer can readily apply it.

OUR EVENING MEETINGS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Upon more than one occasion has the hope been expressed, that during the recess, which takes place between the last of the past and the first evening meeting of a new season, papers upon interesting subjects should be prepared ready for the next campaign. The realization of this hope, in a much more extended degree than has hitherto been the case, may still be urged upon the Members, Associates, and all who feel an interest in the advancement of the Society and its evening meetings; and it may be repeated how desirable it is that the communications upon every branch connected with Pharmacy and Chemistry should greatly increase in number, keeping up a continued and unflagging stream; so that time for complete discussion, and not subjects, may in future be the greatest want. With such an extensive field as Pharmacy and Chemistry offer, and with more than two thousand Members and Associates, there should never be any lack of papers upon the table, nor should there be any empty seats around it.

Having thus far introduced the subject, it may not be amiss to mention some of the reasons which have operated in some degree in limiting the number of papers at the evening meetings. It has been supposed by some that the matter offered for discussion should at least possess the merit of novelty. Now, however much the interest of a communication may be increased by a certain amount of novelty, it cannot, or at least it should not be expected that at every meeting there should be introduced to our notice an aluminium, a chloroform, a glycerine, a pepsine, an amylene, a bael, a kousso, or an anderjou; but it might reasonably be remembered, that although the contents of a paper may, in

the eyes of a large proportion of the Members, partake of the antique, there may still be a large number to whom it comes for the first time as information. Many a preparation is introduced, talked of, prescribed, sold, and taken in London, long before it has even been heard of in other places; and likewise in London, with those preparations which emanate from the country and elsewhere. And long would it continue so, if every one considered the well-known of one locality to be equally that of another, and but for the information conveyed through this and other journals.

A second reason, which probably influences some, is a degree of diffidence or distrust as to whether a subject, which appears very interesting to the introducer, should be found only partially so by others. To this it may be said that every atom of information, practical or theoretical, calculated to attract and engage the attention of a portion only of a large Society, cannot fail of being acceptable.

Another deterring motive, is the dread of criticism. But this should at once be treated as groundless. One great object of the evening discussions appears to be the eliciting the opinions of others, and, if possible, adding to the information advanced; and any remarks, whether coinciding or not with our own views, should be received in a kindly spirit, and there will be small fear of disappointment, if we bear in mind the well-known quotation, "frustra laborat qui omnibus placere studet."

A remark made at the Annual Meeting, to the effect that those Members, who, from their position and possession of information, were best qualified to take, train, and instruct youths as apprentices, were frequently the least inclined to take upon themselves the trouble and responsibility, forcibly brings to mind the corresponding fact, that those who, from their position in the Society, and their qualifications as leading men of business, would naturally be looked to as contributing to the Journal or the monthly evening meetings, are not so forward in the ranks as could be desired.

As the contents of the last volume are run over, there is an absence, not entirely, of those names which are or should be "familiar in their mouths as household words;" and sometimes, when gazing upon the empty seats around the council-table, were such a remark admissible, one would be inclined to exclaim, "who will fill our vacant places, who will sing our song to-night?" That the Members take a strong and visible interest in the Society, is evidently manifest, and one fact in particular is sufficient to establish this; for whenever any subject is mooted, containing rather more than the usual amount of interest —the Sale of Poisons Bill, to wit—there is always a much larger gathering of the Members. If, at the commencement of the next session, it should be announced that after the usual distribution of prizes, a paper would be read by any one of our well-tried or newly-installed Members of Council, there would be no empty benches, and late comers would have to seek room in the adjoining library, as in days of old, when the presence of a Pereira, Thomson, or Fownes was sufficient to fill every available corner. In these remarks, let one object alone be visible—namely, the steady advancement of the Society, and an increased supply of papers for, and attendance at our evening meetings. Few attend without reaping some information. May the London Members bear in mind that they have a large connexion of friends and acquaintances in the country, with whom the Journal and the evening meetings offer an excellent and ready medium for a better acquaintance; and in exchange, the Country Members will return a "quid pro quo;" so that at the expiration of another session, we may be able to say with reason and pleasure, "Tempora mutantur et nos mutamur ab illis."

A. F. Haselden.

18, *Conduit Street*, 10*th August*, 1857.

REGISTER OF THE SALES OF OPIUM AND LAUDANUM IN STOCKTON-ON-TEES.

We have received from Mr. Edward Hodgson, of Stockton, a copy of a register of the sales of opium and laudanum in his establishment during the period of a month, with the names of the purchasers, and the quantity sold on each occasion. A similar register in other localities would be valuable, as it would afford the means of comparing the demand for certain poisons in different places. It also furnishes some data as to the amount of labour which would be imposed upon Chemists if registers of a long list of poisons were required to be kept by Act of Parliament.

With regard to the register before us, it should be observed that the population of Stockton is between 12,000 and 13,000. There are six Chemists and Druggists, besides several small shops where a few drugs are sold. The return shows the sale by Mr. Hodgson, one of the six regular Chemists and Druggists. We are informed that the principal part of the above supply of opium and laudanum is obtained by children, the parents being known, but not able conveniently to fetch it themselves. Wholesale orders are not included in the register. The quantity in each sale ranges from ℈j. to ʒij. of opium, and from ʒij. to ℥ij. of laudanum. The same names occur frequently in the list, and the following table gives the total:—

Register of the Quantity of Opium and Laudanum sold by Mr. Edward Hodgson from June 17th to July 16th, both inclusive.

	Number of Purchases.	Opium.	Laudanum.
Stockton-on-Tees, Population from 12,000 to 13,000	292	9ozs. ʒij. Average per day, ʒiiss.	168ozs. ʒj. Average per day, 5ozs. ʒiv. ℈ij.

REPORT OF THE RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION, AND OF THE APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

BY B. H. PAUL, Ph.D.

(*Continued from p.* 131.)

Action of several Salts upon Iodized Starch.—M. Pisani* states that iodized starch is decolorized by solutions of silver salts, mercury salts, arsenious acid, terchloride of arsenic, proto-salts of tin, of iron, and of manganese, terchloride of antimony, and chloride of gold.

By means of iodized starch different compounds of mercury may be distinguished immediately. The compounds corresponding to Hg_2O decolorize it, while at the same time yellow iodide of mercury is precipitated; those corresponding to Hg O, decolorize it also, but no precipitate is produced.

Compounds of tin corresponding to SnO_2 do not decolorize iodized starch, nor does arsenic acid. When the metals whose compounds decolorize iodized starch are oxidized to the utmost by means of nitric acid, the only ones which still exercise a decolorizing action upon iodized starch, are silver and mercury, owing to the great tendency of these metals to enter into combination with iodine.

Vanquelin observed that when nitrate of mercury is rubbed with iodine, protoiodide of mercury is produced, and probably iodate of mercury likewise. When a crystal of iodine is thrown into a solution of nitrate of mercury, it becomes covered with red iodide of mercury, and at the same time a white precipitate of iodate is produced. Nitrate of silver presents the same reaction.

* *Comptes Rendus*, xliii., 1118.

M. Deville has recently pointed out that, in consequence of the great affinity of iodine for silver, even chloride of silver is decomposed by hydriodic acid. M. Pisani finds that by mixing iodized starch with chloride of silver, iodide of silver is produced, while the blue colour is discharged and the chlorine passes into solution.

In the absence of mercury, iodized starch is the most delicate reagent for detecting silver; 100 cub. cent. of a solution containing 0.0001 of silver, decolorized 0.5 cub. cent. of iodized starch immediately, while the same quantity coloured 100 cub. cent. of water distinctly. In a concentrated solution, $\frac{2}{100000}$ grm. of silver may be detected in this way.

By means of iodized starch the presence of silver in the lead of commerce may be detected. For this purpose the metal is dissolved in nitric acid, and, when the solution is cold, a little iodized starch is added. The excess of acid must be neutralized previously with carbonate of lime, so that it may not react upon the iodine. An equal quantity of nitrate of lead, free from silver, acquires a distinct colour when mixed with a drop of the reagent. The iodized starch used in these experiments was prepared according to the method recommended by Quesneville.

Evolution of Ammonia from Guano.—M. Bobierre* has endeavoured to estimate the amount of animal charcoal that is sufficient to prevent the escape of ammonia from guano. The sample tried was Peruvian, containing 0.163 per cent. nitrogen.

1. 30 litres of dry air, at 50° C., was passed over 3 grm. of the moist guano for an hour, and then passed into a flask containing sulphuric acid. It was found that the air had removed 0.00437 grm. nitrogen, or 0.145 per cent.

2. 3 grm. of the same guano was mixed with 1 grm. of powdered animal charcoal, containing 0.095 grm. nitrogen, and the same quantity of air passed over it as in the former experiment. No ammonia was carried away by the air.

3. The same quantity of guano was dried in the open air at a moderate temperature, and stirred meanwhile with a glass rod. After drying, it contained only 0.1503 grm. nitrogen. Consequently the loss was 0.0127 grm.

4. The same quantity of guano was mixed with 0.5 per cent. of animal charcoal, and then dried as in experiment 3. The loss of ammonia was only 0.0009 grm.

5. A rapid current of air was passed for six days over two trays—one containing ordinary guano, the other containing guano mixed with one-third of animal charcoal. The trays were frequently exposed to sunlight. The guano mixed with animal charcoal lost $\frac{2}{1050}$ of nitrogen ; that without charcoal lost 2 per cent.

These results show that guano loses ammonia in drying, and consequently, that in the analysis of guano, the drying apparatus must be connected with a suitable vessel for absorbing the ammonia given off, or the guano must be mixed with animal charcoal before being dried. A mixture of guano with charcoal would also for the same reason be more serviceable for agricultural purposes.

Detection of Phosphorus.—M. Dusart† has devised a method of detecting phosphorus, based upon the fact that phosphorus, phosphides, phosphorus acid, and hypophosphorus acid, give rise to the production of phosphuretted hydrogen in the presence of nascent hydrogen. Phosphuretted hydrogen is to be recognized either by reduction of metallic salts, particularly nitrate of silver; by the garlic odour; by the production of white fumes in contact with air; and by the emerald green colour which it gives to the flame of hydrogen.

This reaction may be shown by passing a current of hydrogen over a fragment of phosphorus placed between plugs of asbestos, in a glass tube drawn out to a fine point at one end. When the jet of gas is ignited the flame round the tube has a green colour, which soon disappears when the tube becomes hot. When the flame is spread out by means of a piece of porcelain held in it, the green colour again becomes apparent, and disappears when the porcelain becomes hot. The coloration of the flame may be rendered permanent by fixing to the end of the glass tube a U tube, dipping into mercury almost to the mouth, so that the mercury may keep the tube cold. The gas then burns with a conical flame, green inside and blue at the outside. The same result is obtained when the phosphorus is put into the gas generator. In this case it would appear to be carried away as phosphoretted hydrogen when it does not amount to more than 0.006 grm., and when the temperature of the liquid does

* *Comptes Rendus*, xliii., 757. † Ibid., xliii., 1126.

not rise too high. When the gas is passed over a long layer of melted caustic potash and anhydrous lime then, through a series of tubes filled with finely-granulated zinc, and heated to 212 deg. F., there is not any perceptible diminution of the intensity of the colour of the flame.

An apparatus which produced in an hour about 10 litres of gas, gave with one milligram of phosphorus 15 litres of gas, which showed the green coloration very distinctly.

When the phosphorus is finely divided, as in the composition used for charging matches, the coloration is rather more intense, but less persistent. With one centigram of this composition M. Dusart obtained a very distinct coloration of the flame, and at the same time a reddish deposit upon the porcelain, either of very finely divided phosphorus, or of solid phosphoretted hydrogen. The phosphorescence could be recognized in the dark at the end of the tube, and also after introducing a few bubbles of air in the generating vessel. This experiment is, however, attended with some danger. White vapour was also produced when the gas collected over water was brought in contact with air, and a succession of detonations took place when the gas was allowed to escape from a capillary tube. The coloration of the flame was very distinct after the lapse of an hour and a half.

This indication of the presence of phosphorus is quite as delicate as the production of an arsenical mirror according to Marsh's method, and is of much longer duration. The green coloration of the flame cannot be confounded with that produced by copper, boracic acid, or hydrochloric acid. Arsenic or antimony in any considerable amount communicate to the flame a white appearance, and diminish its intensity.

The odour of the hydrogen generated by means of iron is ascribed by M. Dusart solely to the presence of phosphuretted hydrogen. The gas generated by means of iron free from arsenic or antimony, burns with a green flame, but if it is passed over pumicestone, saturated with solution of nitrate of silver, the garlic odour disappears, and it burns with a barely visible blue flame, without any trace of green, and with a slight deposition of soot at the point. In the silver salt phosphate of silver could be detected. It is essential in this experiment that the gas should be passed through melted caustic potash, so as to separate the sulphuretted hydrogen, because this would interfere with the coloration indicative of the presence of phosphorus.

Some Reactions of Oxide of Chromium.—M. Chancel* states that when alkaline solutions of oxide of zinc and of oxide of chromium are mixed together, the metal which may be present in excess, precipitates the other in the state of oxide. In this way a green precipitate may be obtained, which, when washed and dried, has the composition Cr_2O_3, ZnO, analogous to that of chrome iron ore, magnetic oxide of iron, and the compounds of sesquioxide of chromium, with other bases, recently described by Pelouze.

The same reaction takes place when an alkaline lead solution is mixed with an alkaline chromium solution. The precipitate produced is green, and has the composition Cr_2O_3, PbO.

M. Chancel also observed that when an alkaline chromium solution is mixed with brown peroxide of lead, and slightly warmed, the whole of the chromium is converted into chromate of lead, which remains dissolved in the alkaline liquid. After separating the excess of peroxide of lead by filtration, chromate of lead may be precipitated from the yellow solution by neutralizing the alkali with acetic acid. This reaction furnishes a ready means of converting chromic oxide into chromic acid; it may be effected more easily and with greater precision than by fusion with nitrate of potash.

Characters of Arabin.—Dr. C. Neubauer† has repeated the examination of arabin, and has obtained the following results :—

1. Arabin is a decided acid, reddens litmus, and even displaces carbonic acid from carbonate of soda.

2. Arabin, while moist, is readily soluble in water ; but after it has been dried, it loses this character. It then merely swells up in water, and does not dissolve until a base is added.

3. The water solution of pure arabin does not give a precipitate with alcohol ; but when a drop of hydrochloric or nitric acid, or of any saline solution is added, the arabine is immediately precipitated.

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* *Comptes Rendus*, xliii., 927. † *Annalen der Chemie und Pharmacie*, cii., 105.

4. The solution of arabin, mixed with alcohol, remains clear for weeks, and at the most presents only a slight opalescence.

5. Arabin combines with lime, magnesia, potash, soda, &c., giving rise to substances which are soluble in water, and are precipitated by alcohol. According to the amount of base, these compounds present an acid, neutral, or basic reaction.

6. The solution of gum arabic in water has always an acid reaction. It is, in fact, an acid salt—arabate of lime, magnesia, and potash. According to the analyses by Löwenthal and Hausmann, the ash of the finest gum arabic contains 96 per cent. of these bases.

Dr. Neubauer prepared arabin by dissolving colourless gum arabic in cold water, strained the solution, added a few drops of hydrochloric acid, and then precipitated by alcohol. The precipitate was washed with alcohol by decantation, until the whole of the acid was removed; then dissolved in water, and again precipitated by alcohol, after adding a drop of hydrochloric acid. These operations were repeated several times, and the last washing was continued until nitrate of silver did not give any precipitate either in the alcoholic filtrate, or in the water solution of the arabin. The substance thus obtained is pure arabin, and presents the appearance of a snow-white amorphous powder.

The fact that pure arabin is not precipitated by alcohol, has not hitherto been noticed, and the quantity of salt solution or of acid, which is sufficient to determine the precipitation by alcohol, is so small that it may be readily overlooked. The existence of an insoluble modification of arabin is likewise a new observation.

New Mode of producing Aniline.—Prof Wöhler* finds that when nitrobenzol is digested for some time with a solution of arsenious acid in strong caustic soda, and frequently shaken, meanwhile, it is converted into aniline. The operation may be conducted in a retort, and the aniline distils over. It is purified by neutralizing the distillate with an alcoholic solution of oxalic acid.

Isomorphism between Isomeric Substances differing in their Relation to Polarized Light.—In studying the crystalline form of substances that are active in relation to polarized light, M. Pasteur† found that they were dissymmetric, and he applied to this general fact the term of "*hemiedrie non superposable*," because their reflected images did not correspond, in the same way that a right hand glove does not fit the left hand. In other words, these forms do not possess a symmetric arrangement. All tartrates and malates, cane sugar, milk sugar, tartramide, asparagin, &c., have such forms. As some active substances do not present this kind of hemiedrism, and as M. Pasteur assumed that this was only accidental, he endeavoured, by changing the conditions of crystallization, to produce the hemiedric forms. In all the cases which he observed he found that there were conditions by which non-superposable hemiedric forms could be produced.

Hitherto, therefore, the law which he discovered in reference to the mutual relation between hemiedrism and phenomena of molecular rotation appeared to be general. It was still questionable whether this relation was a necessary one, and whether an active substance could be hemiedric in form and structure. The contrary appeared possible. Consequently, a substance that is hemiedric in form and structure cannot possess the capacity of molecular rotation as is the case with quartz, formiate of strontia, and chlorate of potash. On the other hand, it is a question whether it is possible that capacity of rotation may exist and still not be indicated by the form or crystalline structure. M. Pasteur has found that active amyl alcohol is a substance of this kind; it presents in its compounds non-superposable hemiedrism.

On a former occasion, M. Pasteur showed that amyl alcohol consists of a varying mixture of two isomeric alcohols, one of which is active, the other inactive, like all other known alcohols. The similarity of the two is also shown in their compounds.

There is only one way of separating the salts of these two alcohols, viz., the fractional crystallization of the sulpho-amylate of baryta; the more soluble salt is the active one, it remains in the mother-liquors in crystallization.

The active compound has always the same crystalline form as the corresponding inactive compound. In previous investigations M. Pasteur has met with isomeric active and inactive substances with the same crystalline form; for instance, the bimalates of lime and of ammonia. But the active bimalates may be distinguished

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* *Annalen der Chemie und Pharmacie*, cii., 127. † *Comptes Rendus*, xlii., 1259.

by a congeries of faces, which are inclined towards one side, while in the inactive bimalates these faces are regularly arranged. In short, the active substances present non-superposable hemiedrism ; the inactive substances do not ; and this is the sole difference.

In the case of the sulphoamylates, active and inactive, the identity of form is on the contrary absolute, a circumstance which is the more remarkable, since the identity of crystalline form has hitherto only been observed in substances whose molecular arrangement is the same—that is to say, in substances which are isomorphous. In this case the position of the atoms is different, but this is not indicated by the form ; and this identity of crystalline form and chemical composition coincides with differences of solubility.

Since it is necessary to alter the conditions of crystallization, in order to render the hemiedrism of active substance recognizable, it might be objected that although the forms of the amyl compounds did not present any geometric hemiedrism, the crystalline structure might nevertheless be dissymmetric, which is generally shown by the geometric hemiedrism. This, M. Pasteur states, is not the case. It would appear that the existence of hemiedric structure in an organic product, combined with the absence of this character in the corresponding isomeric substances, is a consequence of the impossibility of a combination of the several molecules of these substances in different or in all proportions. Assuming, for example, that the active bimalate of lime and the isomeric inactive bimalate were mixed in solution, and that in crystallization their several molecules were to combine in the same manner as the molecules of two isomorphous substances, the consequence of this would be, that the hemiedrism of the new form would indicate the new structure, and that according to their respective value and relations.

A priori it does not appear that such conditions of crystallization should be a necessary impossibility. Nevertheless it would be an unexpected fact in the present state of science, and experiment must decide with regard to it. M. Pasteur has, therefore, endeavoured to crystallize together active and inactive isomeric substances which have the same crystalline forms with the exception of the differences originating from hemiedrism; and he has found that, in all cases, they separate from one another in the same way that two salts which are not isomorphous separate, according to their solubility, when the mixed solutions are evaporated. It may be said that, in most instances, the active and inactive substances repel each other; when one is deposited, the other remains in solution. This does not take place as if the latter substance could not crystallize; for when the mother-liquor is poured off, it soon deposits crystals of the other substance even without further evaporation.

It happens, on the contrary, that all corresponding active and inactive amyl compounds present the same composition, the same crystalline form, and the most absolute and decided isomorphism. This is the case, not only in reference to the sulphoamylate of baryta, but also with the lead and strontium salts, as well as the active and inactive amylamin alum.

M. Pasteur infers from this absolute isomorphism of the active and inactive derivatives of amyl, that the hemiedric structure does not exist in the active substances. But this proof is not sufficient. The hemiedric structure might, under certain conditions, be present. While the form remained the same, the structure might be altered in proportion to the amount of the two substances that combine, and a hemiedric face might indicate it by an altered inclination towards the other persistent faces of the crystal.

The difficulty of studying the faces of the crystalline forms of sulphoamylate of baryta and the amylamin alum, the crystals of which are thin laminæ, in which several faces cannot be observed, renders it necessary to seek for further proofs of so unexpected a phenomenon.

M. Pasteur has endeavoured forcibly to produce the hemiedrism in the salt that is produced by the combination of the active with the inactive amyl compounds. The hemiedrism of the amyl group, he argued, must, if it exists, show itself in the new product, either absolutely or by hindering the isomorphism of the two amyl groups.

He succeeded in obtaining crystals of sulphamylate of cinchonine—an active base, which possesses the character, in common with most active substances, of communicating the hemiedrism of form and structure to the substances into whose composition it enters. The active and inactive sulphamylate of cinchonine were found to have the same crystalline form, and also the absolute isomorphism, of other

sulphamylates with inactive bases. Nevertheless, these sulphamylates, besides these very characteristic peculiarities, are always hemiedric; their hemiedrism, indicated by the same faces, is constantly the same, whatever may be the relative amount of the two salts combined together. It is evident, therefore, that the hemiedrism, in this case, is solely attributable to cinchonine, and that the amyl group does not contribute to the hemiedric structure of any of these crystals.

The sulphamylate of cinchonine was obtained in crystals of such size, regularity, and transparency, that no doubt could remain as to the facts above stated.

In the same way, therefore, that substances free from any unsymmetric arrangement of molecules such as quartz, formiate of strontium, or chlorate of soda, may assume crystalline structure and hemiedric form, so, on the contrary, substances may present neither structure nor hemiedric form, and yet be constituted of unsymmetric groups of molecules. In the above substances the molecules of silica, formiate of strontium, or of chlorate of soda, may be imagined, at the moment of crystallization, to be grouped in a dissymmetric order. The structure, viz., the crystal, is then dissymmetric itself, but the materials of which it is constructed are not so. The proof of this consists in the fact that in solution, when the crystal no longer exists, this dissymmetry disappears, and that by recrystallization of the crystals of formiate or chlorate of soda which rotate to the right or left only, two kinds of crystals are obtained rotating to the right and left.

In the same manner chemists and physicists will undoubtedly recognize in the above described substances dissymmetric molecules, which at the moment of crystallization arrange themselves in secondary groups. The molecules arrange themselves according to the laws of homiedric structure, in such a manner that the form and structure of the crystal does not present any dissymmetric arrangement. Thus, for instance, a cube or any other homiedric figure may be constructed with irregular tetrahedrons. But when the structure has been broken up by solution, the materials of which it consists manifest their individual dissymmetry in their action upon polarized light.

Evolution of Heat attending the Molecular Alteration of Sulphur and of Iodide of Mercury.—M. Regnault's observation, that the alteration of soft sulphur is attended with evolution of heat, has been extended by Hr. Rud. Weber* to γ sulphur that has hardened after a long time. The elevation of temperature is less than in the case of soft sulphur. This modification of sulphur, when heated in a water-bath, becomes brownish-yellow, crystalline, and is then completely soluble in bisulphide of carbon. The passage from the insoluble to the soluble state is probably the cause of the slight elevation of temperature, which is sufficient, however, to produce a partial fusion or softening of the sulphur.

Hr. Weber has ascertained that when the insoluble modification of sulphur is heated to 212° F. in a steam bath, the temperature of the sulphur rises in a short time to 219° or 222° F., remains fixed for a while, and then sinks again to 212° F. Meanwhile, the sulphur has passed from the insoluble modification to the soluble modification. The insoluble modification of sulphur may be obtained by rapidly cooling melted sulphur and digesting the mass with bisulphide of carbon.

The insoluble modification of sulphur exists in the flowers of sulphur of commerce, together with the granular sulphur described by Magnus,† which is also insoluble in bisulphide of carbon. The residue left after digesting flowers of sulphur with bisulphide of carbon, becomes crystalline and soluble when heated in a water-bath, but this takes place so much more slowly, that the elevation of temperature cannot be recognized with certainty. On the contrary, the granular sulphur, when heated in the same manner, presents a very sensible evolution of heat.

The sulphur precipitated by acids from hyposulphite of soda, presents a similar behaviour to the γ sulphur; it melts when heated in a water-bath, then solidifies, and leaves, when digested with bisulphide of carbon, a portion of insoluble sulphur, while the solution yields on evaporation a large quantity of granular sulphur.

The molecular changes of iodide of mercury present similar relations. When the pulverulent precipitate, obtained by mixing solutions of iodide of potassium and chloride of mercury, is warmed over a small flame in such a manner as not to melt or aggregate together, it becomes yellow. It is then allowed to cool, and when put

* Poggendorff's *Annalen*, c., 127.
† *Journ. für prakt. Chemie*, lxiii., 215.

into a test-tube round a thermometer, and stirred with a platinum wire, the temperature rises about 6° or 7° F. when half an ounce of iodide is used, and meanwhile the iodide passes from the yellow to the red modification. It is essential in this experiment that the yellow powder should not be melted, for in that case it passes to the red modification merely by cooling.

Composition of the Solid Portion of Olive Oil.—Hr. Krug* has, under the direction of Prof. Heintz, carried out the examination of the solid fat acids in olive oil. Some time since Prof. Heintz questioned the statement made by M. Collet, that the oil contains an acid which melts at 140° F., and which he considered to be the margaric acid of Chevreul. At that time, however, his opinion was based only upon the physical characters of this acid, especially the melting point. Since then the acid has been analyzed by Hr. Krug, and found to have the following composition ;—

	I.		II.		Calculated.	
Carbon	74.78	.....	74.90	.....	75.00	..... 32C
Hydrogen	12.60	.....	12.52	.....	12.50	..... 32H
Oxygen	12.62	.....	12.58	.....	12.50	..... 4O
	100.00		100.00		100.00	68

These numbers correspond very closely with those required by calculation for the formula representing palmitic acid, and Professor Heintz considers that they leave no doubt as to the existence of palmitic acid in olive oil.

For the purpose of separating the acid which is associated with palmitic acid in the solid products of saponification obtained from olive oil, ten pounds of the oil was saponified, the fat acids separated, exposed to a low temperature, and pressed. The residue was dissolved in less than half its volume of alcohol, the solution cooled to a very low temperature, the solid portion pressed again, and these operations repeated several times, until the whole of the oleic acid was separated. The solid acid thus obtained was subjected to fractional precipitation in such a way, that at first a portion was precipitated by acetate of magnesia; the filtrate was then mixed with some acetate of baryta, and the filtrate from this precipitate again treated with acetate of baryta. The fat acids separated from these several precipitates melted at 58°.2, 46°.4, and 32°.4, C. The latter two were recrystallized once, and the melting point was thereby raised to 54°.8 and 53°.8, C. The first portion was recrystallized several times, and the melting point was gradually reduced to 54°.8, 55°.4, 53°.8, and 52°.0, C. The fact that the melting point is lowered by recrystallization shows that in this mixture of acids there is a small amount of acid that is sparingly soluble in alcohol, mixed with a larger amount of acid that is readily soluble in alcohol. This latter acid is probably palmitic acid.

By repeated crystallization and fractional precipitation an acid was obtained whose melting point was 71°.4 C., but the quantity was too small to admit of a pure substance being obtained, and consequently it was analyzed merely for the purpose of ascertaining whether it contained a larger amount of carbon than stearic acid, corresponding to the higher melting point. Analysis gave the following results :—

		Calculated.		Calculated.	
Carbon	76.72	..... 76.05	36C	..... 76.92	40C
Hydrogen	12.75	..... 12.68	=36H	..... 12.82	=40H
Oxygen	10.53	..... 11.27	4O	..... 10.26	4O
	100.00	100.00		100.00	

The presence of stearic acid could not be ascertained with certainty. It is, however, very probable that it does exist, together with the acid which has a higher melting-point, from the fact that there is so much difficulty in separating the less fusible acid from the palmitic acid, either by crystallization or by partial precipitation. If stearic acid were not present there is reason to believe that the separation of the less fusible acid from the palmitic acid, which is so much more soluble than butic acid in alcohol, would not have been attended with such difficulty.

It appears, therefore, according to these results, that olive oil contains, besides

* *Journ. für prakt. Chemie*, lxx., 300.

olein, palmitin, and probably stearin and butin, or at least a fat which, by saponification, yields an acid which has a higher melting-point and a larger amount of carbon than stearic acid.

Gallactic Acid and Pectolactic Acid.—Hrn. Bödecker and Struckmann* have examined these substances, which are produced by the oxidation of milk-sugar in alkaline solutions. When a solution of milk-sugar is mixed with sulphate of copper and then with caustic soda, and warmed, the solution that remains after the precipitation of the suboxide of copper, contains either both of these acids, or only gallactic acid, when there is enough copper salt present for the complete decomposition of the sugar. In the reaction not a trace of formic acid is produced, and besides the above-named acids no sensible amount of any other product of decomposition is to be detected.

The separation of the two acids may be effected by means of their lead salts; for this purpose sulphuric acid is separated from the solution by means of acetate of baryta, and the filtered liquid precipitated with neutral acetate of lead and then with basic acetate. The first precipitate consists of gallactate of lead, the second of pectolactate of lead.

The acids are obtained from the lead salts by means of sulphuretted hydrogen. Care must be taken that the pectolactic acid does not contain any hydrochloric acid originating from chloride of sodium in the caustic soda, since this would decompose the acid during the evaporation of the solution. The separation of hydrochloric acid may be easily effected by digesting the solution with freshly precipitated carbonate of silver, afterwards removing the dissolved silver by sulphuretted hydrogen.

Both these acids are uncrystallizable, and do not yield crystallizable salts with any bases. When the solution of either acid is evaporated, they remain in the state of syrup. The gallactic acid is of a yellowish colour; the pectolactic acid brownish-yellow. These acids are very similar in their characters; without odour, have a strong acid taste, are deliquescent, and not volatile. When heated upon platinum foil, they melt, then ignite, giving off the same smell as burnt malic acid, and leave a shining porous coal. They are both soluble in all proportions in water and alcohol, but are insoluble in ether.

The composition of gallactic acid was ascertained by the analysis of the lime, lead, and mercury salts. It proved to be bibasic, and the composition corresponds with the formula $C_{14} H_3 O_7$, 2HO. It differs from the gallic acid in containing less water by three equivalents.

The lime salt is very hygroscopic; the lead salt is a white powder; the mercury salt is white when recently precipitated, and pale yellow when dried. The salts of gallactic acid with potash, soda, ammonia, magnesia, baryta, and oxide of zinc are readily soluble in water; some of them are deliquescent, and are precipitated as white flocks by alcohol. When their solutions are evaporated, they leave varnish-like masses.

The composition of the pectolactic acid was determined by the analysis of the acid itself, on account of the uncertain characters of its salts. It was found to correspond with the formula $C_{16} H_6 O_{10}$ 2HO.

This acid has a great similarity to the metapectic acid, both in composition and characters, and hence the name of pectolactic acid was given to it.

The salts of pectolactic acid with alkalies and alkaline earths are readily soluble in water, and with the exception of the lime salt are insoluble in alcohol. The tin salt is a white insoluble powder, the copper salt a blue powder, soluble in caustic soda. The silver salt soon becomes brown. The mercury salts are insoluble in water and acids. The neutral lead salt is soluble in excess of acetate of lead; both it and the basic lead salt are soluble in acids.

Since, with the exception of the very small quantity of humus substance produced by the action of the alkaline liquid upon milk-sugar, gallactic acid and water are the only substances produced in the complete oxidation of milk-sugar by means of oxide of copper, the nature of the reaction may readily be ascertained by estimating the quantity of oxygen, or, what is the same thing, the quantity of oxide of copper requisite for the oxidation of a given quantity of milk-sugar.

Hrn. Bödeker, Rigaud, Krause, and Städeler were of opinion that 180 parts of milk-sugar required for decomposition 277.9 parts of oxide of copper. But more recent experiments, made with a copper solution prepared according to Fehling's

* *Annalen der Chemie und Pharmacie*, c. 264.

method, and with pure milk-sugar, have led Hr. Bödeker to infer that this is not correct, and that the production of gallactic acid and pectolactic acid corresponds better with the proportion of 180 parts of milk-sugar with 272 parts of oxide of copper.

If this is the case, 7 equivalents of sugar would take 24 equivalents of oxygen, and yield 6 equivalents of gallactic acid with 54 equivalents of water—

$$C_{84}\,H_{84}\,O_{84} + O_{24} = 6\,(C_{14}\,H_5\,O_9) + 54HO.$$

Or assuming that there was not enough oxide of copper to effect complete oxidation, 4 equivalents of milk-sugar, together with 12 equivalents of oxygen, would yield 3 equivalents of pectolactic acid and 24 equivalents of water—

$$C_{48}\,H_{48}\,O_{48} + O_{12} = 3\,(C_{16}\,H_8\,O_{12}) + 24\,HO.$$

The further oxidation of pectolactic acid and its transformation into gallactic acid may be represented by the equation—

$$7\,(C_{16}\,H_8\,O_{12}) + O_4 = 8\,(C_{14}\,H_5\,O_9) + 16\,HO.$$

Moreover the gradual oxidation of milk-sugar may be represented thus:—

$$28\,(C_{12}\,H_{12}\,O_{12}) + O_{84} = 21\,(C_{16}\,H_8\,O_{12}) + 168\,HO \text{ and}$$
$$21\,(C_{16}\,H_8\,O_{12}) + O_{12} = 24\,(C_{14}\,H_5\,O_9) + 48\,HO$$

According to this view of the reaction, the conversion of milk-sugar into pectolactic acid would consist in the substitution of one equivalent of oxygen for two equivalents of water, and the conversion of pectolactic acid into gallactic acid would consist in the substitution of one equivalent of oxygen for every four equivalents of water eliminated. Regarding the conversion of milk-sugar into gallactic acid as a direct process, so that twenty-four equivalents of oxygen and seven equivalents of milk-sugar are converted into water and gallactic acid, the whole amount of oxygen in the two substances will be equally divided between the acid and water produced.

It is remarkable, that in this process of oxidation, the carbon does separate into two or more groups, as is so frequently the case in the other decompositions of sugar, even by means of energetic oxidizing agents.

Huanochin, an Alkaloid in Peruvian Bark.—Some ten years since a sample of bark was imported into Bremen, which was at first sold under the name of *Cortex Peruv.*, and described by Delondre and Bouchardat under the name of *China de Huanuco plana.* It appeared to have been collected from *Cinchona nitida* in the woods of Huanuco. Hr. Erdmann* describes this bark as being generally free from periderm, and presenting the greatest resemblance to *China calisaya* (*regia plana*), but differs from it in the loose texture, slender wedge-shaped form, in the irregular cavities in the surface of the derma, and in the thin, soft, fissured periderm, covered with coloured lichens and fungi.

When chewed, this bark has a sharp taste, but is not astringent or bitter, and it contains a peculiar alkaloid, to which Hr. Erdmann has given the name of huanochin. He obtained it by the following method:—

Four pounds of the crushed bark was boiled with 54 pounds of water and two ounces of hydrochloric acid (1.2 sp. gr.), pressed, and again boiled with fresh acid and water twice. The clear liquids were mixed with caustic soda until slightly alkaline, and the precipitate thus produced was washed with water and dissolved by acetic acid, which left a reddish-brown residue. Caustic soda precipitated from the acetic solution a tolerably colourless substance, which was digested with alcohol until nothing further could be extracted. The alcoholic solution was decidedly alkaline, and when concentrated, yielded shining crystals, which were rendered colourless by means of animal charcoal and recrystallization. One pound of bark yielded about one drachm of the alkaloid.

The characters of this base show that it differs from quinine as well as from the other bases of bark. It crystallizes in small prisms and has no taste, though the alkaline solution is slightly bitter. It is almost insoluble in water, at 62° F. it dissolves in 400 parts of alcohol of 80 per cent., and at the boiling point in 110 parts of alcohol. It dissolves in 600 parts of ether at 62° F., and in 470 parts of boiling ether. It melts readily and sublimes; it burns with a smoky flame, and does not leave any residue.

* *Annalen der Chemie und Pharmacie*, c., 341.

The sulphate of this base is almost insoluble in water, readily soluble in excess of sulphuric acid, sparingly soluble in alcohol and in ether. The hydrochlorate is copiously soluble, crystallizes in large clear prisms of a very bitter taste.

The double salt with chloride of platinum is a pale yellow crystalline powder, sparingly soluble in hot water, alcohol, or ether, but more soluble in excess of chloride of platinum, from which solution it may be obtained in well-developed crystals.

The soluble salts of this base give with caustic and carbonated alkalies, white precipitates ; with infusion of galls, a white precipitate ; with chloride of gold, a yellow precipitate ; with perchloride of iron, potassio-tartrate of antimony, sulphate of copper, iodide of potassium, and oxalate of potash, they do not give precipitates. Chloride of mercury forms with it a white insoluble double salt.

The analysis of this base and of its hydrochlorate and the double salt with chloride of platinum gave the following results for 100 parts:—

					Calculated.
C.	77.54	77.68	—	.....	77.92
H.	7.73	7.76	7.71	.....	7.79
N.	8.81	—	—	.....	9.09
O.	—	—	—	.....	5.15
					100.00

The hydroclorate gave 19.30 per cent. of chlorine, and the platinum compound 27.81 and 27.80 per cent. platinum.

These numbers agree with the formula $C^2_0\ H_{12}\ NO$, which requires 18.63 per cent. chlorine, and 27.50 platinum. This base is therefore isomeric with quinine.

The therapeutic value of the hydrochlorate of this base has been tried by Drs. Homeier and Schmidt, both of whom consider that it is an efficient remedy for intermittent fever.

Occurrence of Tannic Acid in Plants.—It has hitherto been considered that tannic acid is not one of the earliest products of assimilation in the plant organism, but rather among the number of substances which are not included within the circle of vital action ; that it is a product of the oxidation of cells that have lost vitality. Dr. H. Karsten* has been led to question the correctness of this opinion, by his observations made upon the fruit of *musa sapientum*, which in the ripe state contains a very large amount of sugar, and in the unripe state is full of starch granules, with the exception of some longitudinal rows of wide tun-shaped cells, lying in the midst of the starch tissue, similar to sap vessels, and arranged concentrically in the substance of the fruit. These wide cells contain a clear juice, with small floating transparent vesicles, which gives a fine blue colour with perchloride of iron solution, while the other parts of the fruit do not give any such coloration. He considers that there is no doubt the tannic acid in this case is produced in the midst of the starch tissue, and not in parts of the plant that were subject to incipient decay, but in those parts which are in a state of normal development. The leaves of this plant contain tannic acid in rows of cells, and in vessels formed of the union of such cells. Dr. Karsten has observed the same fact in a number of other plants. In some instances the cells and vessels containing the tannic acid become very much thickened, which would seem to support Pettenkofer's opinion, that the production of tannic acid is closely connected with the production of wood.

The parenchyma of leaves also contains tannic acid in the cell juice. In gall-nuts the whole tissue is saturated with this substance. It would seem that a vessel containing tannic acid, which in the oak is produced in the wood cambium, is punctured by the insect, and in this way an opening is made, through which the tannic acid is poured into the tissues, and gives rise to the abnormal condition of the organs.

According to Dr. Karsten, tannic acid does not occur free in plants, but combined with another substance that is coagulated by alcohol and by acids. This compound is decomposed by contact with atmospheric air, and then the reaction with perchloride of iron takes place. This is shown by the fact, that when a cutting of a plant is immersed in perchloride solution, the tannic acid does not enter into

* *Bericht der Akad. der Wissens. zu Berlin*, 1857, 71.

combination with the iron until the cutting, after being impregnated with the solution, is exposed for some time to the air. It is only in those tissues of plants which are exposed to the atmosphere, by pores or otherwise, that the blue coloration indicative of tannic acid is produced immediately, by the application of perchloride of iron.

Composition of Fruit.—Prof. Wolff* has examined several varieties of apples and pears. He gives as the average composition of seventeen kinds:—

	Apples.		Pears.	
Water	84.74			80.02
Dry substance	15.26			19.98
Insoluble substance	—	2.75	6.53	—
Substances dissolved in the juice	—	12.25	13.43	—
Sugar	—	7.46	9.26	—
Pectin, albumen, and salts	—	4.23	3.01	—
Free (malic ?) acid	—	0.82	0.58	—
		100.00	100.00	

He found that pears differ more in composition from this average than apples, and that the essential difference between these fruits consists in the amount of sugar, which he found to be always two per cent. or one-fourth greater in pears than in apples.

PHARMACY IN AUSTRALIA.

BY MR. W. ARCHER.

Pharmacy in Australia has hitherto been in much the same state as it was in Great Britain previous to the formation of the Pharmaceutical Society. In the colony of Tasmania, or Van Dieman's Land, an enactment has for some time been in force, requiring all persons commencing business as Druggists to pass an examination before a medical board of examiners: in the other Australian colonies no such law is in existence; the number of Druggists was small; each individual came to the colonies with his own stock of ideas and drugs, acting on the one and selling the other at his own discretion. The trade is now carried on much the same as in England; stocks are imported, principally from London and Liverpool; the London Pharmacopœia is our standard; our shops are similar to those in the other hemisphere. Great improvements have taken place in the manner of conducting business within the last few years; competition is greater, and fortunes are not made rapidly. There is about the same amount of antagonism here between General Practitioners and Druggists as in the mother country, these general gentlemen having very general ideas indeed. Almost every medical and a great many non-medical men in this colony rejoice in the title of "Doctor," the degree being generally conferred during the passage out, and adhering to them (or the adherence being more probably on the side of the "doctor") with great pertinacity. The public, as usual, do not properly discriminate between one doctor's shop and another, naturally concluding that the owner of the blue bottle or of the lamp of sanguinary hue has an equal right to the title, whether he be Druggist or Apothecary. We have "highly odoriferous hair oil" prepared and sold by M.Ds., as well as pills of as universal applicability as those of Holloway prepared and sold by men of the same degree, wholesale, retail, and, if possible, for exportation. Medical hieroglyphics are not unknown, and we are becoming familiarized with the per-centage system; but, "take us all in all," we Druggists confine ourselves pretty closely to our legitimate business; and, if medical men would do the same, we should go on quietly enough. But, unfortunately, or perhaps fortunately, they will have a flying shot at us now and then, the sportsmen usually belonging to that very general class of practitioners before alluded to; still there are many high-minded, honourable men in medical practice here, who confine themselves to their proper functions and deservedly occupy the highest places in public estimation. However, Pharmacy is looking up in Australia; within the last few months, Pharmaceutists, or, as the old nomenclature is used here, Chemists and Druggists, have been goaded into combination by two distinct attacks of the medical body. In 1856, by the introduction of a Bill into the Legislative Assembly "to provide for the registration of duly-qualified medical practitioners."

* *Wurtemb. Woehenblatt für Land, u. Forstwirtschaft*, 1856, No. 18.

Had it passed, it would have provided for us in a very unsatisfactory manner, for clause 15 states—"If any person shall, at any time after the expiration of three months after the election of the said board (medical, of course), vend any medicine or drug in the colony of Victoria without having obtained a license to do so from such board, which license the said board are hereby empowered to grant on being satisfied of the competency of the person applying for the same, every person so offending shall forfeit and pay a sum not exceeding fifty pounds: provided that no person being a wholesale importer of drugs or medicines shall be prevented from vending the same by wholesale." Clause 19 says—"Any person who shall, after the expiration of one month from the first election of the medical board as aforesaid, for fee or reward, practise as Physician, Surgeon, or Apothecary, or prescribe to be taken or administered any medicine, or do or perform any surgical act or operation, not having obtained a certificate from the board of examiners as a qualified medical practitioner as hereinbefore provided, shall pay on conviction fifty pounds for the first, and not less than fifty nor more than one hundred pounds for every subsequent offence," &c. The bill containing these clauses was rejected, owing to the representations of the Druggists, ably enforced by several of the more intelligent members of council. Another medical bill is now ready for introduction, which, as published in the *Australian Medical Journal*, confines its provisions to the object of providing for the registration of medical practitioners. About the commencement of the present year, a bill "to regulate the safe-keeping and sale of arsenic and other poisons and their administration" was brought before the council. Any one acquainted with these colonies is aware how commonly arsenic, strychnine, and corrosive sublimate are sold without restriction, the trade in poisons being open to any one who likes to engage in it, the only wonder being that poisonings are not much more frequent. The bill referred to contained several impracticable clauses, providing that no person should sell opium or any of its preparations, chloroform, or any other deleterious or narcotic drug to an unknown person without the presence of a witness known to the seller; also, that no laudanum, chloroform, or other deleterious or narcotic drug should be applied or administered to any child under two years of age, or to any female from two to fourteen years of age, unless ordered by a medical man. This bill met with some opposition from the Druggists, and the second reading was postponed for a considerable time; however, a combination of Druggists having been effected, it was decided to attempt to form a Pharmaceutical Society of Victoria, and, after numerous preliminary meetings, a general meeting was held on the 20th of May, for the purpose of electing a council and adopting a code of rules. At a subsequent meeting of council, officers were elected for the ensuing year, a draft of a Pharmacy Bill was brought before the council, subscriptions have come in satisfactorily, and the infant society is fairly on its legs.

Geelong, Victoria, May 27th, 1857.

THE ATLANTIC TELEGRAPH.

In an article on this subject in our last number (p. 131), an account was given of the preparations which were then being made for laying the electric telegraph cable across the Atlantic. It is therein stated that two methods had been suggested for laying the cable—one proposition being that the two ships, Niagara and Agamemnon, each having one-half of the cable on board, should proceed together to a point midway between the two coasts, where the two ends of the cable would be joined, and the vessels steering in opposite directions, would deposit their burden as they proceeded; while the other proposition was, that one end of the cable should be secured on the coast of Ireland, from whence it would be extended at once towards the coast of Newfoundland, the second half being joined on after the first had been laid. It having been determined to adopt the latter of these propositions, and everything being ready, the process of paying out the first half of the cable commenced on the evening of the 7th August. From that time until the morning of the 11th August, the operation proceeded satisfactorily—telegraphic communication being constantly kept up between the ship (the Niagara) and the shore; but on the 11th, this communication suddenly ceased, and those in charge of the signaling apparatus on the land, became aware that some accident must have happened. It was soon afterwards found that the cable had broken at a distance of about 250 miles from the starting point. The following extracts from an official report, presented to the

Directors of the Company by Mr. C. T. Bright, who had the management of the laying of the cable, will explain the cause and probable effect of this accident :—

"After leaving Valentia on the evening of the 7th inst. the paying out of the cable from the Niagara progressed most satisfactorily until immediately before the mishap.

"At the junction between the shore and the smaller cable, about eight miles from the starting point, it was necessary to stop to renew the splice; this was successfully effected, and the end of the heavier cable lowered by a hawser until it reached the bottom, buoys being attached at a short distance apart to mark the place of union.

"By noon of the 8th we had paid out 40 miles of cable, including the heavy shore end, our exact position at that time being in lat. 51° 59′ 36″ N., long. 11° 19′ 15″ W., and the depth of water, according to the soundings taken by the Cyclops, whose course we nearly followed, 90 fathoms.

"Up to four P.M. on that day the egress of the cable had been sufficiently retarded by the power necessary to keep the machinery in motion at a rate a little faster than the speed of the ship; but as the water deepened, it was necessary to place some further restraint upon it by applying pressure to the friction drums in connexion with the paying out sheaves, and this was gradually and cautiously increased from time to time as the speed of the cable, compared with that of the vessel, and the depth of the soundings, showed to be requisite.

"By midnight 85 miles had been safely laid; the depth of water being then a little more than 200 fathoms.

"At eight in the morning of the 9th we had finished the deck coil in the after part of the ship, having paid out 120 miles. The change to the coil between decks forward was safely made.

"By noon we had laid 136 miles of cable, the Niagara having reached lat. 52° 11′ 40″ N., long. 13° 10′ 20″ W., and the depth of water having increased to 410 fathoms.

"In the evening the speed of the vessel was raised to five knots per hour. I had previously kept down the rate at from three to four knots for the small cable, and two for the heavy end next the shore, wishing to get the men and machinery well at work prior to attaining the speed which I had anticipated making.

"By midnight 189 miles had been laid.

"At four o'clock in the morning of the 10th the depth of water began to increase rapidly from 550 fathoms to 1750 in a distance of eight miles. Up to this time 7 cwt. strain sufficed to keep the rate of the cable near enough to that of the ship; but as the water deepened the proportionate speed of the cable advanced, and it was necessary to augment the pressure by degrees until in the depth of 1700 fathoms the indicator showed a strain of 15 cwt., while the cable and ship were running $5\frac{1}{2}$ and 5 knots respectively.

"At noon on the 10th we had paid out 255 miles of cable, the vessel having made 214 miles from shore, being then in lat. 52° 27′ 50″ N., long. 16° 00′ 15″ W. At this time we experienced an increasing swell, followed later in the day by a strong breeze.

"From this period, having reached 2000 fathoms water, it was necessary to increase the strain to a ton, by which the rate of the cable was maintained in due proportion to that of the ship.

"At six in the evening some difficulty arose through the cable getting out of the sheaves of the paying-out machine, owing to the tar and pitch hardening in the grooves, and a splice of large dimensions passing over them. This was rectified by fixing additional guards and softening the tar with oil.

"It was necessary to bring up the ship, holding the cable by stoppers until it was again properly disposed around the pulleys. Some importance is due to this event, as showing that it is possible to lie to in deep water without continuing to pay out the cable—a point upon which doubts have been frequently expressed.

"Shortly after this the speed of the cable gained considerably upon that of the ship, and up to nine o'clock, while the rate of the latter was about 3 knots by the log, the cable was running out from $5\frac{1}{2}$ to $5\frac{3}{4}$ knots per hour. The strain was then raised to 25 cwt.; but, the wind and sea increasing, and a current at the same time carrying the cable at an angle from the direct line of the ship's course, it was not found sufficient to check the cable, which was at midnight making $2\frac{1}{2}$ knots above the speed of the ship, and sometimes imperilling the safe uncoiling in the hold. The retarding force was therefore increased at two o'clock to an amount equivalent to 30 cwt., and then again, in consequence of the speed continuing to be more than it

would have been prudent to permit, to 35 cwt. By this the rate of the cable was brought to a little short of 5 knots, at which it continued steadily until 3.45, when it parted, the length paid out at that time being 335 miles.

"I had up to this time attended personally to the regulation of the breakers, but, finding that all was going on well, and it being necessary that I should be temporarily away from the machine to ascertain the rate of the ship, and to see how the cable was coming out of the hold, and also to visit the electrician, the machine was for the moment left in charge of a mechanic who had been engaged from the first in its construction and fitting, and was acquainted with its operation.

"I was proceeding to the fore part of the ship when I heard the machine stop; I immediately called out to ease the break and reverse the engine of the ship, but when I reached the spot the cable was broken.

"On examining the machine, which was otherwise in perfect order, I found that the breaks had not been released, and to this or to the handwheel of the break being turned the wrong way may be attributed the stoppage, and the consequent fracture of the cable. When the rate of the wheels grew slower as the ship dropped her stern in the swell, the break should have been eased; this had been done regularly before whenever an unusually sudden descent of the ship temporarily withdrew the pressure from the cable in the sea; but, owing to our entering the deep water the previous morning, and having all hands ready for any emergency that might occur there, the chief part of my staff had been compelled to give in at night through sheer exhaustion, and hence, being shorthanded, I was obliged for the time to leave the machine without, as it proves, sufficient intelligence to control it.

"I perceive that on the next occasion it will be needful, from the wearing and anxious nature of the work, to have three separate relays of staff, and to employ, for attention to the breaks, a higher degree of mechanical skill.

"The origin of the accident was no doubt the amount of retarding strain put upon the cable, but had the machine been properly manipulated at the time it could not possibly have taken place.

"It has been suggested as a cause of the failure, that the machinery is too massive and ponderous. My experience of its action teaches otherwise; for three days in shallow and deep water, as well as in rapid transition from one to the other, nothing could be more perfect than its working, and since it performed its duty so smoothly and efficiently in the smaller depths, where the weight of the cable had less ability to overcome its friction and resistance, it can scarcely be said to be too heavy for deep water, where it was necessary for the increased weight of cable to restrain its rapid motion by applying to it a considerable degree of additional friction. Its action was most complete, and all parts worked well together. I see how it can be improved by a modification in the form of sheave, by an addition to the arrangement for adjusting the breaks and some other slight alterations; but with proper management, without any change whatever, I am confident that the whole length of cable might have been safely laid by it; and it must be remembered, as a test of the work which it has done, that, unfortunate as this termination to the expedition is, the longest length of cable ever laid has been paid out by it, and that in the deepest water yet passed over."

The Directors of the Company have not yet determined whether another attempt to lay the cable should be made this autumn, or whether it should be deferred until next summer. The prevailing opinion is, that the present pause in the undertaking has been the result of an accident which, with the experience thus purchased, may be guarded against on a future occasion. The following observations are extracted from a well-written article in the *Observer* of August 23rd:—

"Among other experiences which have been obtained is the very important one that a margin of 600 miles is not sufficient to allow for the 'slack' in paying out the cable, and it has been considered advisable not to start with less than 1000 miles beyond that which would be sufficient to connect in a straight line the two shores. The discovery of this fact introduces some very important elements into the consideration of the practical working of a submarine telegraph of such great length. Despite all that has been said of the instantaneous transmission of the electric current, there is yet a perceptible period of time required to enable the electricity to travel 3000 miles. The question of retardation of the electric current was one which some time since appeared to present grave objections to the successful carrying-out

of any plan for telegraphing at very long distances. The earliest experiment made with something more than 1400 miles of insulated wire, showed that the interval of the seconds beat of a pendulum were not sufficient to allow one transmission to clear itself off before another was upon its heels, and that all attempts to make out signals sent at the rate of 60 per minute would be attended with failure. If every distinct signal should require a second of time for its transmission, the telegraph would be comparatively useless, and as a commercial undertaking would be far less successful than its promoters and the public would wish. This was indeed a serious discovery, and had it not been for the happy thought of sending alternately different kinds of electricity along the line, the hopes of an Atlantic Telegraph would not have advanced so far as it has now done towards realization. It was found that a current of positive electricity which would cling so pertinaciously to its conductor as to require a second of time to get clear off the line, might have its movements wonderfully facilitated if a discharge of negative fluid were despatched immediately behind it; and, in the same way, the negative would cease to lag in its course, if a positive flash were in its rear. Taking advantage, then, of this mysterious law of electrical action, it was found possible to transmit signals at the rate of eight per second throughout these 1400 miles. The theory of Faraday and others, that the force of the current of electricity would diminish in the ratio of the square of the distance to be traversed—that is to say, whatever might be the force of the current at a distance of 100 miles from the point of its transmission, it would be thirty-six times less at a distance of 600 miles, was required to be tested. If in the case of the difficulty to which we have just referred it was found desirable to measure the speed at which this wondrous fluid would travel, it was necessary, in order to test the value of the theory respecting the diminution of force, that this 'essence of the thunder storm' should be accurately weighed. It may appear strange to talk of weighing the lightning, but it has been done, and that most satisfactorily. A very ingeniously-constructed steelyard was made, and a powerful battery with 72 plates was set to work, and the force exerted upon the magnetized end of the steelyard was registered by the instrument at 25,000 grains, at the end of 200 miles of wire it lifted 10,650 grains, at 400 miles 3250, and with 600 its power had fallen to 1400 grains. These experiments, combined with a number of others, made throughout the whole 2500 miles of telegraph wire on board the Agamemnon and Niagara, proved that both the speed and force of the electric current diminished not in proportion to the square of the distances, but in an arithmetical proportion much more favourable to the success of the science of ocean telegraphy than had been at first supposed. This loss of speed and power will of course be increased by the additional 500 miles of cable which it is thought will be required to be paid out in order to complete the communication across the Atlantic. It may not very seriously affect the rate of speed in the transmission of signals, but every hundred miles to be traversed by the mysterious agent which the Prosperos of science compel to do their bidding, must add something to the time consumed, and to the cost of transmitting the signals. Batteries of increased power, too, will be rendered necessary by this addition to the distance required to be traversed. By placing a sixpence and a small piece of zinc on the tongue, and connecting the two pieces of metal by the ends of a wire 500 miles in length, a sufficient quantity of voltaic electricity would be generated to traverse that distance, and record a signal by means of some of the more delicately made instruments. Voltaic electricity, although more powerful in its mechanical action, is, however, less rapid in its movements than magnetic electricity. In this there is evidenced the truth of the well-known axiom of mechanical science respecting the relations of force and speed. The experiments made through the Atlantic cable have sufficed to show the maximum power of the batteries required for transmitting signals through the distance, under the circumstance in which the cable was coiled, but there is every reason to believe, from other experiments, made through that portion of the cable which had been submerged, that the temperature of the water at great depths being about 48° F., and the pressure or weight of the column of water above the cable, will so materially assist the process of telegraphing, as to render less powerful batteries adequate to the transmission of the electric currents.

"Not only has experience confirmed the opinion of the possibility of telegraphing with certainty through the long distance of 2500 miles, but notwithstanding the

accident which has occurred, it has shown that the cable or road along which the electric currents are to pass is not only well adapted to become their highway, but is not less well suited for submergence on the plateau on which it is intended to be laid. The size, strength, and mode of construction of this cable have been criticised with a degree of acrimony for which it is most difficult to assign any adequate reason. From the first outset of the undertaking, the construction of the cable formed the subject of very serious and anxious deliberation, and the present form was not decided upon until after some sixty or seventy specimens had been submitted to, and tested by, the engineers of the company. The qualities which were wanted in the cable were, that it should be sufficiently heavy to sink quickly to the bottom of the sea by its own gravity when launched from the stern of the vessel. At the same time the cable must not be too heavy, otherwise it would become unmanageable in the process of paying out. The cable lost in the Mediterranean weighed eight tons per mile, the one between Spezzia and Corsica is eight tons to the mile, while the one now made is about one ton to the mile. Had the Atlantic cable been of the weight of eight tons per mile, it would have weighed 20,000 tons, and half a score of Niagaras or Agamemnons would have been required to stow away the enormous line. But, while on the one hand it must not be too heavy, it was necessary on the other hand that the cable should not be so light as to be at the mercy of the currents in the process of paying out, as if it were the length would be greatly increased, and the difficulties arising from the retardation of the electric currents would present themselves in a still more imposing form than at present. What have been the results of the experience of the capabilities of this cable? Every engineer on board the ships, every electrician, and every naval officer, have, we believe, united in expressing their opinion in favour of its elasticity, strength, and admirable conducting properties, and in recommending that, in the event of its being necessary to construct another one, the same principle should be adopted. The Atlantic telegraph has been sunk to a greater depth and for a longer distance than any submarine line yet laid, signals have been transmitted through it over the bed of the ocean, at a depth of two miles below its surface, and with increasing efficiency; and so far, therefore, practical results are in favour of this particular cable. This fact disposes of all the apprehensions and predictions which have been indulged in that the strain upon the conducting wire will so far attenuate it as to make it practically useless for the purposes of telegraphing. When the first railway was opened in this country, there was a practical man who placed himself under one of the arches, and confidently uttered his oft-repeated prediction, 'the wheels won't bite;' but the train rolling along over his head gave a practical refutation to the opinions which he had so doggedly maintained. On another occasion there was a man of theory and science who proved to demonstration that a steamer could not make a passage across the Atlantic, but the Sirius steamed into port just before the learned *savan* had time to withdraw from circulation his ably-argued essay. So has it been with this Atlantic cable, and there will no doubt be found some who will boldly state the impossibility of completing the great work until a message flashed beneath the ocean shall silence, if it does not convince, the scientific sceptic."

REPORT OF THE GENERAL BOARD OF HEALTH ON DEODORIZING AND UTILIZING THE SEWAGE OF TOWNS.

A VERY interesting report has just been issued by the General Board of Health on the important subject of the application and the deodorizing of the sewage of towns. The importance of the subject can now be scarcely overrated. In the two or three hundred towns to which the Public Health Act has been applied—and in various other towns works under private improvement Acts have been carried out—a general system of main and house drainage has been effected; all cesspools in these places either have or are in course of being done away with; the refuse of the towns, instead of finding its way into those old-fashioned receptacles, is now discharged into the different water-courses and rivers; and the consequence is, that the waters in these rivers have become so foul and impure as to be unfit for human consumption or domestic use. What, then, to do with the sewage, is a subject that cannot be

put aside; it must be dealt with at once. Again: its value for agricultural purposes is variously estimated; one section of agriculturists and chemists give it almost a fabulous value, whilst others deem it all but useless.

Mr. Austin, the chief superintendent of the Board, was deputed to examine and report on the subject. To this end he visited all the principal farms where sewage manure, either in a solid or liquid form, has been adopted; and he has also directed his attention to the different methods in use in deodorizing the sewage. The results of his labours are shown in some of the following conclusions. He says—

"That although, from the earliest agitation of the question of sanitary reform and of the complete drainage of towns, the mischief from pollution of rivers on the one hand, and the waste of valuable manure on the other, by the direct discharge of the sewage, was insisted upon, no conception was at any time formed of the *extent* of the evil, which now so imperatively calls for a remedy."

After stating that the means of remedy by deodorization are as yet imperfectly understood, he says—

"That chemical research has not yet arrived at any satisfactory method of economically arresting from solution the fertilizing ingredients in sewage; while the analysis of solid sewage manures manufactured under various patents shows that, although for the most part possessing a low value, they do not justify the high prices at which they have been offered to the public; nor does there appear to be evidence of any agricultural results derived from their use which will support such a view of their value. That the manufacture from excrement of a dry, portable manure, as practised at Paris, although realizing results of greater value, is applicable only where the cesspool system prevails, and leads to an aggravation of that system which due regard for the public health would not tolerate. That the separate system of drainage frequently proposed as a solution of the sanitary and agricultural difficulties of the sewage question, would increase immensely the cost of drainage works, would add to the sources of danger to the public health, and would tend to a waste of fertilizing power. That the practical experience obtained during many years at Edinburgh and Milan has shown the great value of sewer water on grass lands, although applied in a state of great dilution; while valuable experiments have shown the power of soils to remove from solution and retain for vegetation the fertilizing elements. That, notwithstanding the enormous quantities of sewage water which have been applied to the land at Edinburgh, the produce is said to be always in corresponding ratio to such quantity, and that the limits of quantity to be applied and of produce to be realized have not yet been ascertained. That the precise value of the manure in a given quantity of sewer water may be readily determined; and, therefore, that the corresponding quantity of water which must be applied to convey a certain required quantity of such manuring elements on to land may be known. That, although such immense agricultural results have been obtained from the irrigation with sewage water at Edinburgh, the method employed has given rise to much complaint of nuisance. That this arises for the most part from foul deposits in wide ditches, and from the large evaporating surfaces of the sewage constantly exposed in the channels of irrigation. That all such sources of nuisance and danger are preventible, and should not be tolerated. That no ditches should be used; and that the sewage should be exposed only during the act of irrigation of each portion of the land, when it would be immediately absorbed and deodorized by the soil. That, in order to avoid all further risk of injury to health, whether from the discharge of the sewage into the rivers and streams, or from its application to the land, it appears desirable that the solid matter should in every case be separated from the liquid sewage at the outfall, and that a cheap portable manure should be manufactured therefrom for use in the immediate neighbourhood, as practised at Cheltenham. That it should be mixed with the ashes of the town, or such other deodorizing material as may be most suitable for application to the surrounding land, and prepared, if desirable, with other ingredients for particular crops. That it appears probable that such operation will in most places pay its own expense, but that as some such measure is absolutely necessary for the public health, even although involving some expense, it should be the duty of local boards and other governing bodies to carry it out just as much as the arrangements devolving upon them for removal of dust or other refuse of the town. It should form, in fact, part of such service, and might be combined in the same contract. That the liquid portion of the sewage thus cleared of its solid matter, but still retaining its chief value as

manure, might then be applied with benefit to the neighbouring lands in any quantity; but that all land upon which this method of application of the sewage is practised should, if not naturally porous, be artificially drained; as the liquid, if allowed to become stagnant, would, as in common irrigation, be likely to engender disease in the neighbouring inhabitants, or in cattle exposed to its influence. That the distribution of manures in the liquid state by the hose and jet, from a system of underground pipes, on the land, has been found, by the experience of several years upon farms in England and Scotland, most advantageous, and that the outlay for such works is considered by eminent agriculturists, who have had experience of their benefits, as a very profitable outlay, irrespective altogether of the question of sewage distribution. That although the adoption of the same system at Rugby and other places for the distribution of liquid sewage has been found decidedly successful, the great Edinburgh results are not attainable by this method, unless conjoined with more ample and ready means for getting much larger sewage on a given area, in less time and with less labour and expense than can be done with the hose. That upon grass lands, for which its application is best adapted, these larger quantities of the liquid sewage, deprived of its grosser particles, may be economically distributed, especially upon the lower lands, by a combination of the underground pipe system with the subsidiary open irrigation by small contour gutters, practised by Mr. Beckford. That this work being of a commercial or speculative nature, and not so much required for the safety of the public, would fall rather within the province of local companies or proprietors, than of the local authorities, and to those parties all facilities should be granted for carrying it out. That the solid *sewage* manure, prepared and deodorized as above proposed, may be anywhere used, and any quantity of the liquid applied and absorbed on properly drained land, without any risk of injury to health, and without any of the offensiveness constantly experienced from farm-yard and other solid manure applied as top dressings. That in any neighbourhoods, however, where no opportunity exists for this beneficial irrigation, the liquid sewage before being discharged into rivers or streams, should, after separation of the solid matter, be treated with lime or other deodorizing and precipitating agents, a duty which should devolve upon the local board or other governing body, as a precaution in which the public health is materially concerned. Lastly, that it is an object of immense public concern that the poisonous accumulations of our towns, now fast becoming the sources of pollution of our rivers and streams, should, without delay, be rendered powerless for further mischief, and applied as Nature's laws demand, for reproductive uses. That by this means the greatest sanitary problem will be solved, and the greatest advancement of agricultural prosperity secured."

Such are the conclusions to which Mr. Austin has arrived after a most careful research. The report itself contains a mass of information, which will prove of great value in aiding the solution of this very difficult but important subject.

IMPROVED CONSTRUCTION OF RUHMKORFF'S INDUCTION COIL.

Mr. Hearder, of Plymouth, has written us a letter, in which he complains of the account of his improvements in the construction of Ruhmkorff's coil, as given by Dr. Noad in his *Manual of Electricity*, and quoted at page 33 of the present volume of this Journal. He says:—"Dr. Noad's book only contains an account of my earliest labours, and the particulars were furnished to him in the early part of the year 1856, with an understanding that his book would be published in April, 1856, whereas it did not appear until February, 1857, during which interval I had made vast improvements in the apparatus." The improvements which Mr. Hearder had effected, and which he says are identical with those made by Mr. Bentley,* were communicated to the *Philosophical Magazine* at an earlier date than that at which Mr. Bentley's improvements were described in that journal. At Mr. Hearder's request, we willingly insert his paper, which appeared in the *Philosophical Magazine* for December, 1856 :—

ON A NEW ARRANGEMENT OF THE INDUCTION COIL.

BY JONATHAN N. HEARDER, PLYMOUTH.

In my communication to the last number of the *Philosophical Magazine*, I confined myself to the announcement of a few of the novel results which I had obtained from

* In the *Philosophical Magazine* for August, 1857, Mr. Bentley points out several differences between his coil and that described by Mr. Hearder.

investigations with my induction coil. I might have given many more, but purposely refrained from doing so until I had had an opportunity of repeating my experiments with a still more powerful machine, as certain indications had led me to believe that many of the results which have hitherto been announced as peculiar to the action of the induction coil have been disguised by the mode of construction of the instruments of M. Ruhmkorff; such, for example, as the ignition of the negative terminal only, and the comparative inertness of the terminal proceeding from the inner portion of the coil. These and other effects appeared to me to indicate that M. Ruhmkorff's secondary coil could not be perfectly insulated from the primary one, and that the true statical condition of the two terminals could not consequently be accurately ascertained and compared.

It happened in the first arrangement of my machine that I was led to construct all its elements separate and independent of each other, for the purpose of ascertaining how modifications of any of them influenced the action of the rest. The secondary coil in this case was perfectly insulated, and I was frequently struck with unexpected results, especially in the improved arrangement of my first machine alluded to in my last paper, since both terminals would sometimes become heated, and the inner terminal was possessed of such high statical intensity that it could not be handled with impunity. In a still more powerful machine which I have recently constructed, and which I am about to describe, these phenomena are more strikingly evident; and but for the arrangement which I have adopted, I believe that they would not have been developed.

The machine consists of a gutta percha bobbin of about 12 inches in length, the cylindrical centre of which is large enough to receive the primary coil with its core. Upon this bobbin is wound the secondary coil, consisting of fine copper wire covered with silk, and carefully varnished with shellac, which is allowed to dry previously to winding on. The consecutive layers of the wire are separated from each other by a stratum of oiled silk or sheet gutta percha. I am thus enabled to wind off and relay the wire to repair accident; and I have more than once found the advantage of the arrangement; for, on forcing my first machine to a very extreme point of tension, the internal insulation broke down, and on winding off the wire I discovered the cause of the accident, and was able to apply the appropriate remedy. The contact breaker which I employ is similar to that of my medical coil machine, consisting of a very stiff brass spring, armed at one end with a piece of iron, to be attracted by the end of the iron core, and breaking contact by means of a platina stud fixed about the centre of its length, and pressing against a contact screw also armed with platina. The condenser is, as in Ruhmkorff's machine, enclosed in the base of the instrument. The secondary coil is rather less than three miles in length. My exciting battery is a modification of Grove's nitric acid battery, the zinc being excited with muriate of ammonia instead of dilute sulphuric acid, by which the amalgamation of the zinc is dispensed with, and the battery is in every respect equally powerful. With twelve cells the following effects are produced with the coil :—

The spark at the interruptor is loud, brilliant, and flame-like, frequently throwing out a flat sheet of flame of a peculiarly distinctive character, as large as a shilling, or even larger. By a connecting screw the condenser can be detached, when the ordinary secondary spark appears at the break very different from that which occurs when the condenser is used.

Each secondary terminal gives sparks to an uninsulated conductor, which are longer when the opposite terminal is communicating with the ground, sometimes more than an inch in length; and on connecting the terminals with a graduated Lane's discharger furnished with platina points, torrents of sparks in bundles pass between them at a distance of 2.5 inches. At 2.75 sparks still pass, but not in such quantities; and on modifying the vibrations of the spring with the finger, so as to vary slightly the pressure, occasional sparks will pass nearly 3 inches in length.

On approximating the points to within 0.4 or 0.5 of an inch, both become white-hot, the negative being rather hotter than the positive; and on substituting fine iron wires for the platina points, both enter into combustion. Fine platina wires become white-hot at the ends, melt, and run back into globules.

Through the flame of alcohol a flood of sparks will pass between 8 and 9 inches in length, producing a curious zigzag circuit, and accompanied with very loud crepitations.

In an exhausted receiver, 3 feet in length and 4 inches in diameter, a splendid

ribbon of light is produced of the most exquisite colours, the centre line being bright, and surrounded by an intense crimson light, shading off into violet and purple. I have only yet tried a receiver of these dimensions, but should consider from appearances that the light would pervade a much longer vacuum.

I have only tried Gassiot's cascade in a flower-vase 10 inches high, but there can be no doubt that a flower-vase of 2 or 3 feet in height would be equally well illuminated, as I was obliged to use only 3 or 4 cells, otherwise the action of the machine was too strong. The contrast in the appearance of the light on reversing the current is most beautifully exhibited. On making the inside of the vase positive, the electricity appears to flow in an immense sheet out over the edge to a considerable distance, and fall upon the plate of the pump; but on reversing the current, a totally different appearance is produced: the sheet appears now to envelop the vase more closely, and to flow up and turn in over the rim, the direction of the current in each case being too decided to be mistaken.

I have not yet heard of any effects from a single machine which have at all approximated to these results; and as I believe that the arrangement is not only more powerful, but possesses important advantages over that adopted by M. Ruhmkorff, I have not hesitated to bring it before the scientific world. I find it, however, absolutely necessary to identify myself with the process of manufacture, as even the most careful workmen are apt to overlook what may appear to them trifles, but which are, however, in fact the main causes of success or failure. I am also satisfied that the foregoing effects, although of an unusual character, are but trifles compared with what may be obtained from a judicious extension and modification of the principles; and I even doubt whether I have yet attained the maximum effect from the secondary wire of the machine which I have now described, as the secondary current, although increased by extra battery power, depends more upon the magnetic intensity of the iron core than upon any modified conditions of the battery current and primary coil, except so far as they shall combine to exalt the magnetic condition of the included core.

ON THE POWER OF POROUS MEDIA (SAND AND CHARCOAL) OF REMOVING MATTER FROM SOLUTION IN WATER.

BY HENRY M. WITT, F.C.S.,
Assistant Chemist to the Government School of Applied Science.

VARIOUS methods have been employed at different times for the purification of water for the supply of towns, but none has been found so practically convenient and efficacious as simple filtration through porous media, such as sand ; moreover, charcoal being known to possess a peculiar power of removing *organic* matters from solution, this substance has been suggested and occasionally employed either as a substitute for, or an auxiliary to, ordinary sand filtration.

The following experiments were undertaken with the view of ascertaining by chemical analysis the more precise nature of the effects produced upon ordinary river-water, such as that of the Thames, by its passage through filters composed of these media respectively, and of comparing their powers ; but it is believed that the results obtained possess an interest extending considerably beyond the question to assist in the solution of which they were made.

Before proceeding to the construction of experimental filters, I availed myself of the kindness of Mr. James Simpson, engineer to the Chelsea Waterworks Company, to investigate the results obtained by that Company's system of filtration as carried on up to the present time at Chelsea ; and I have much pleasure in embracing this opportunity of expressing my obligation to this gentleman, and specially also to his son, Mr. James Simpson, jun., to whom I am greatly indebted for his very able co-operation throughout this inquiry.

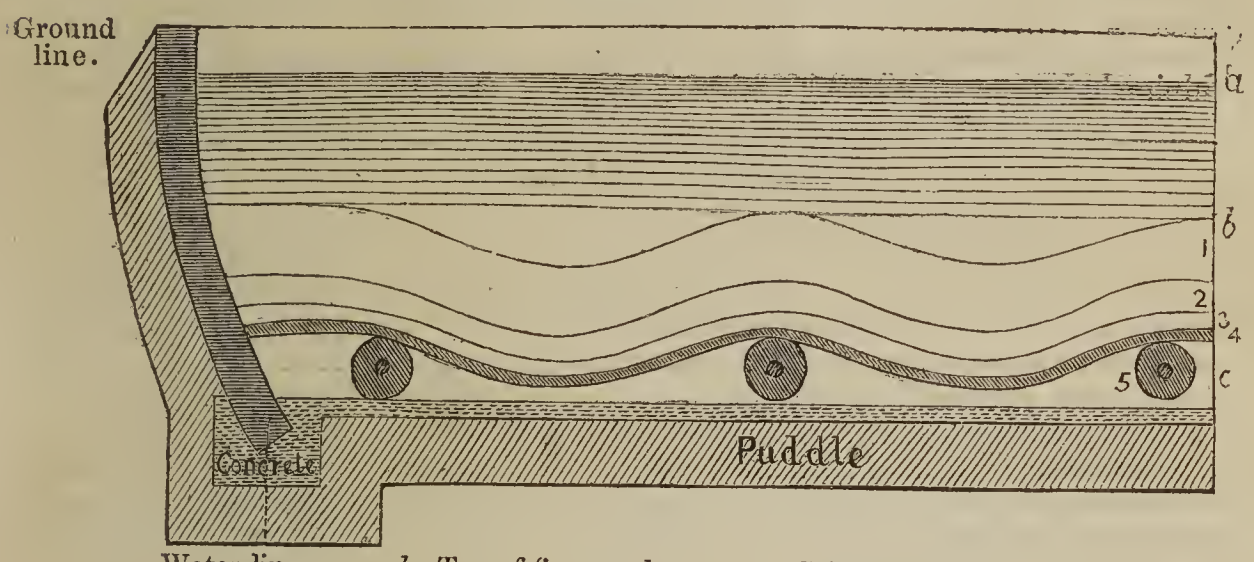
The system of purification adopted by the Chelsea Waterworks Company at their works at Chelsea, consisted hitherto (for the supply has by this time commenced from Kingston) in pumping the water up out of the river into subsiding reservoirs, where it remained for six hours ; it was then allowed to run on to the filter beds. These are large beds of sand and gravel, each exposing a filtering surface of about 270 square feet, and the water passes through them at the rate of about $6\frac{1}{4}$ gallons per square foot of filtering surface per hour, making a total quantity of 1687.5 gallons per hour through each filter.

The filters are composed of the following strata in a descending order :—

		ft.	in.
No. 1.	Fine sand	2	6
2.	Coarse sand	1	0
3.	Shells	0	6
4.	Fine gravel	0	3
5.	Coarse gravel	3	3

These several layers of filtering materials are not placed perfectly flat, but are disposed in waves, as seen in the sectional drawing ; and below the convex curve of each undulation is placed a porous earthenware pipe, which conducts the filtered water into the mains for distribution.

Chelsea Waterworks, Thames Bank. Transverse Section of Filter. Downward Filtration.



a. Water line. *b.* Top of fine sand. *c.* Collecting drain (perforated).

Note.—Depth of water over the sand=4 ft. 6 in.

The upper layer of sand is renewed about every six months, but the body of the filter has been in use for about twenty years.

Samples of water were taken and submitted to examination—

1st. From the reservoir into which the water was at the time being pumped from the middle of the river.

2nd. From the cistern after subsidence and filtration.

Experiments of this kind were made on three different occasions—viz., on the 12th of September and the 29th of December, 1855, and also on the 10th of May, 1856 ; and the results are embodied in Tables I., II., and III., each containing four columns,—No. 1 showing the quantities of the several substances originally present, represented in grains in the imperial gallon (70,000 grains) of water ; No. 2, the amounts present after filtration ; No. 3, the actual quantities separated in grains in the gallon of water ; and No. 4, the per-centage ratio which the amounts separated bear to the quantities originally present.

Results of Filtration through Sand at the Chelsea Waterworks.

TABLE I.—September 12, 1855.

	1. Originally present.	2. Present after filtration.	3. Amount separated.	4. Per-centage ratio of separated matter.
Total solid residue (including suspended matter)	65.527	41.290	24.237	36.98
Organic matter	1.240	0.674	0.566	45.63
Total mineral matter.....	64.287	40.616	23.671	36.82
Suspended matter	16.112	...	nearly all.	
Total soluble salts	48.175	40.616	7.559	15.69
Chlorine	12.240	11.140	1.100	
Chloride of sodium.....	20.170	18.357	1.820	9.23

TABLE II.—December 29, 1855.

	1. Originally present.	2. After filtration.	3. Amount separated.	4. Per-centage ratio of separated matter.
Total solid residue (including suspended matter)	31.467	24.153	7.314	23.24
Organic matter	2.375	1.889	0.486	20.46
Total mineral matter	29.092	22.264	6.828	23.47
Suspended matter	7.035	1.403	5.632	80.05
Total dissolved salts	22.057	20.861	1.196	5.42
Lime	8.675	8.402	0.273	3.14
Chlorine	1.667	1.546	0.121	7.25
Chloride of sodium	2.747	2.547	0.200	7.28
Sulphuric acid	2.962	2.372	0.590	19.92

TABLE III.—May 10, 1856.

	1. Originally present.	2. After filtration.	3. Amount separated.	4. Per-centage ratio of separated matter.
Total solid residue (including suspended matter)	55.60	22.85	32.75	58.90
Organic matter	4.05	1.349	2.70	66.66
Total mineral matter	51.55	21.501	30.049	58.29
Suspended matter	28.93	2.285	26.645	92.10
Total dissolved salts	22.62	19.216	3.404	15.04
Lime	8.719	8.426	0.293	3.36

By these analytical results (if entitled to confidence, and I may state that all due care and attention was given to ensure their accuracy) it is shown that this process of mere sand filtration is one of more importance, and of a more peculiar and interesting character, than has generally been supposed.

It has been asserted as a principle that sand filtration *can* only remove bodies mechanically suspended in water, but I am not aware that this statement has been established by experiment; in fact, I am not acquainted with any published analytical examination of the effects of sand filtration.

These experiments supply the deficiency, and show, moreover, that these porous media are not only capable of removing suspended matter (80 to 92 per cent.), but even of separating a *certain appreciable quantity of the* SALTS *from* SOLUTION *in water!* viz., from 5 to 15 per cent. of the amount originally present, 9 to 19 per cent. of the common salt, 3 per cent. of the lime, and 5 of the sulphuric acid.

It is curious also that the proportion of matter removed in this way depends to a certain extent upon the degree of impurity of the water; the greater the quantity of matter originally present in the water, the larger the per-centage ratio of the salts removed, *e. g.*:—

	In Sept.	In Dec.	In May.
Total impurity of water	65.527	31.467	55.90
Per-centage of salts removed	15.69	5.42	15.04

This point will, however, become more apparent by comparing these experiments with those made at Kingston, where the water is much purer, to which I shall have occasion hereafter more particularly to refer.

This fact, of the power possessed by sand and other porous media, which rests for demonstration not only upon the three preceding experiments, but also upon others to be presently described, is one of great importance, not only in a hygienic and economic point of view as relating to the great question of water supply, but also in its bearings upon agriculture and geology.

It is possible that soils may remove matters from solution in water, not only by

decompositions between the contained salts and the aluminous silicates of the soil (as demonstrated by Mr. Way), but also in virtue of this peculiar action.

Again, water containing considerable quantities of saline matter in solution may, by merely percolating through *great masses* of porous strata during *long periods*, be gradually deprived of its salts to such an extent as probably to render even sea-water fresh.

This may in fact be one of the causes contributing towards the production of fresh-water springs which ebb and flow with the tide in the vicinity of the sea : for instance, Darwin, in the *Voyage of the Beagle* (vol. iii., p. 545), mentions that on Keeling Island, one of the coral reefs near the coast of Sumatra, there are fresh-water wells which ebb and flow with the tide. Mr. Darwin, however, suggests another explanation of this phenomenon ; he says that "at first sight it would appear not a little remarkable that the fresh water should regularly ebb and flow with the tide. We must believe that the compressed sand or porous coral rock acts like a sponge, and that the rain-water which falls on the ground being specifically lighter than salt, floats on its surface, and is subject to the same movements. There can be no actual attraction between salt and fresh water, and the spongy texture must tend to prevent all admixture from slight disturbances. On the other hand, where the foundation consists only of loose fragments, upon a well being dug salt or brackish water enters, of which fact we saw an instance on the small island."

Now I would not presume to deny the accuracy of this explanation, still it is possible that the phenomenon may be a mixed one, and that the peculiar power which I have found to be possessed by porous media may contribute towards the result by abstracting a portion (at least) of the salts from the sea-water during its passage through the porous rock.

Moreover, there are certain difficulties in Mr. Darwin's explanation. If the sand did not possess the power of removing salts from solution, to a certain extent at all events, the rain-water inside would tend, more or less rapidly, to become salt by the commixture with it of the sea-water from without, which would take place through the porous diaphragm so much the more readily on account of their difference of density, in virtue of the "osmotic force" so ably investigated by Professor Graham. Indeed, the last fact mentioned by Mr. Darwin, viz., that when the wall consists of loose fragments the wells are salt, tends to show that it is only the very finely divided sand, the porous medium offering a considerable extent of surface, which possesses the power of removing the salts, for if the non-commixture of the salt and fresh water arose only from their difference of density, the coarseness of the diaphragm would not materially affect it.

As to the *cause* of this peculiar action, the only suggestion which I may venture to offer is, that it possibly arises from the weak chemical affinity in virtue of which salts are held in solution in water, being overcome by a physical force, the attraction of cohesion, or more properly adhesion, exerted by the greatly extended surface of the porous body; this is not a solitary instance of such weak chemical forces as solution being overcome by a physical attraction. Gmelin* instances several other examples of the power of the physical force of "*adhesion*" to overcome weak chemical attractions, *e. g.:* "When vinegar is filtered through quartz sand, the first portion of liquid that runs through is robbed of almost all its acid, and the vinegar does not pass through unchanged until the sand has become well charged with acid. Potato brandy diluted with water, and filtered through quartz sand, yields at first pure water, then a mixture of water and alcohol deprived of its fusel oil, and lastly, the original mixture unaltered : wood shavings also deprive vinegar of nearly all its acid ; charcoal acts still more powerfully."†

Now it is possible that these being organic compounds they may be oxidized, even into carbonic acid and water, under these circumstances ; but whatever difference of opinion may arise respecting the cause, this cannot affect the simple experimental fact.

It will naturally be asked, if sand possess this power, Are not the salts removed from the water accumulated in the sand, and would not this throw light upon the mode of formation of sandstone conglomerate rocks ? To enable me to reply to this question, I have in my possession samples of sand, before use, and also after

* *Handbook of Chemistry*, Cavendish Society's translation, vol. i., p. 114.

† Wagenmann, Poggendorff's *Annalen*, xxv., 600.

employment in the middle of the filter at Chelsea for no less than twenty years, and their analyses will form the subject of a future communication; pressure of other duties having hitherto prevented me from the completion of this important point in the inquiry.

But, as before mentioned, the preceding are not the only experiments which I have made on this subject: the following were performed at Kingston, where the water is far purer, more particularly for the purpose of ascertaining the effects of charcoal and comparing its powers with those of sand.

At the time these experiments were in progress, the Company's filter-beds at Kingston, now just completed, were unfinished, and consequently, in order to ascertain the effects both of sand and charcoal on the comparatively pure water of Kingston, it became necessary to construct smaller experimental filters.

The earlier experiments were upon the effects of charcoal, and several preliminary trials were made for the purpose of ascertaining the form of filter and rate of filtration which would nearest approximate to the operation as carried on on the large scale.

In the first of these experiments, to which attention may be drawn, the water was pumped from the river into a cistern of slate, where a deposition of the greater portion of the suspended matter took place; it was then conducted into the upper part of the right-hand compartment of a nearly cubical wooden cistern, this right-hand compartment being separated from the one on the left by a porous diaphragm, the walls of which were of wire-gauze, and the interior filled with fragments of oak charcoal, about the size of a hazel nut to a walnut: this charcoal diaphragm exposed a filtering surface of about 4.38 square feet; the filtration was lateral and descending, the water entering at the upper part of the right-hand compartment and passing out at the lower extremity of the left-hand division; the rate of filtration being half a gallon per minute.

A sample of the water was analysed before passing into the filter, and after coming from it, after the continuance of the operation for a certain number of hours. The results were as follows:—

TABLE IV.

	Original water used.	After 67 hours' action.			After 91 hours' action.		
		Comparison.	Amount separated.	Per-cent. ratio of quantity separated.	Comparison.	Amount separated.	Per-cent. ratio of quantity separated.
Total residue	23.949	23.668	0.281	1.17	22.076	1.873	7.82
Mineral salts	22.519	...	...	...	21.618	0.901	4.00
Organic matter ...	1.430	0.475	0.955	66.78	0.458	0.972	68.00
Chlorine	1.054	...	...	...	0.9731	.081	7.685
Chloride of sodium.	1.737	...	...	...	1.603	0.134	7.714
		After 115 hours' action.			After 139 hours' action.		
Total residue	23.949	23.012	0.937	3.91	23.411	0.538	2.242
Mineral salts	22.519	...	...	...	22.44	0.079	3.66
Organic matter.....	1.430	0.620	0.810	56.67	0.971	0.459	32.10
Chlorine	1.054	0.885	0.169	16.03	0.973	0.081	9.73
Chloride of sodium.	1.737	1.457	0.280	16.10	1.603	0.134	9.8

This experiment exhibits more strikingly perhaps than any of the others, the very curious circumstance that in the employment of charcoal the amount of impurity separated by it goes on increasing to a certain point, and then diminishes; to which, however, I must again more particularly allude after describing the experiment comparing sand and charcoal simultaneously; it demonstrates also very satisfactorily the power possessed by charcoal, like sand, of removing not only suspended matters, but also soluble salts, *e. g.* chloride of sodium: but to this point I shall again refer.

Although very satisfactory as showing the power of charcoal under the circumstances of the experiment, yet it being probable that by employing the charcoal in

lumps, as was done, it had not a fair chance of exhibiting its peculiar properties, inasmuch as only very imperfect contact was effected between the impurities contained in the water and the particles of charcoal, it was resolved to try an experiment with charcoal in powder, or nearly so, in granules of the size of a pea. Moreover, even then we should have succeeded only in proving the *absolute* effect of charcoal, for we had learnt that the results thus obtained did not admit of comparison with those of filtration through sand at Chelsea, on account of the great difference in the original composition of the water ; therefore, in order to establish at the same time the absolute effect of charcoal as a filtering medium upon the purer water at Kingston, and also to compare it with that of sand, two experiments were made simultaneously with the same water, the one of filtration through charcoal alone, and the other through sand alone, both under precisely similar circumstances. In both these experiments the filtration was not effected laterally as in the foregoing case, but *downwards* in the usual way through beds of the same size of the respective filtering media contained in wooden troughs, the water being admitted at the top and passing off from below.

The sand-filter had an area of 4 square feet, and consisted of the following materials :—

	ft.	in.
Fine sand	1	9
Shells.....	0	1½
Gravel	0	1½
Coarse gravel	0	9
	2	9

The rate of filtration being half a gallon per minute.

TABLE V.—*Results of Sand Filtration.*

	Original water used.	After 23 hours' action.			After 120 hours' action.		
		Comparison.	Amount separated.	Per-cent. ratio of quantity separated.	Comparison.	Amount separated.	Per-cent. ratio of quantity separated.
Total residue	24.578	23.87	0.708	2.88	23.69	0.888	3.613
Mineral salts	23.687	22.858	0.829	3.50	23.04	0.647	2.73
Organic matter ...	0.8906	1.012	...	...	0.648	0.2426	
Suspended matter ..	3.509	2.663	0.846	24.109			
Chlorine	0.862	...	...	...	0.671	0.191	22.16
Chloride of sodium	1.420	...	...	...	1.105	0.315	22.11
		After 240 hours' action.			After 376 hours' action.		
Total residue	24.578	22.534	2.044	8.316	22.507	2.071	8.426
Mineral salts.....	23.687	21.517	2.170	9.161	21.698	1.989	8.397
Organic matter.....	0.8906	0.917	...	...	0.809		
Suspended matter ..	3.509	1.88	1.629	46.423	1.584	1.925	54.85
Chlorine.....	0.862	0.674	0.188	21.8			
Chloride of sodium	1.420	1.110	0.310	21.8			

Apart from its special interest, as compared with the following experiment made simultaneously through charcoal, the following points are in themselves remarkable in the results obtained by this filtration through sand:—

1st. That the filter continued increasing in efficacy even till the conclusion of the experiment, *i. e.* for 376 hours, not having lost any of its power when the experiment was terminated.

2nd. That no weighable quantity of dissolved organic matter was removed by the sand in this experiment ; but it must be remembered that the quantity originally present was but small.

3rd. Its power of removing soluble salts was considerable ; as a maximum, 21 per cent. of the common salt being separated.

TABLE VI.—*Results of Charcoal Filtration.*

	Original water used.	After 72 hours' action.			After 120 hours' action.		
		Comparison.	Amount separated.	Per-cent. ratio of quantity separated.	Comparison.	Amount separated.	Per-cent. ratio of quantity separated.
Total residue	24.578	22.13	2.448	9.906	21.644	2.934	11.93
Mineral matter.....	23.687	21.375	2.312	9.76			
Organic matter ...	0.8906	0.755	0.1356	15.22			
Suspended matter ..	3.509	...	...	...	3.06	0.449	12.79
Chlorine	0.862						
Chloride of sodium	1.420						
		After 240 hours' action.			After 376 hours' action.		
Total residue.....	24.578	20.821	3.757	15.28	21.374	3.204	13.03
Mineral matter.....	23.687	...	...	...	20.604	3.033	12.34
Organic matter ...	0.8906	...	...	...	0.770	0.1206	13.54
Suspended matter ..	3.509	2.79	0.719	20.48			
Chlorine	0.862						
Chloride of sodium	1.420						

On comparing this experiment with the preceding, the following points came out as showing the difference between the effects of sand and charcoal as filtering media.

1st. By the charcoal, speaking generally, a considerably larger quantity of the total residue contained in the water was removed than by the sand, their maximum results being respectively as follows:—

Amount originally present.	Amount separated in grains in the gallon.		Amount separated in per-centage of the quantity present.	
	By sand.	By charcoal.	By sand.	By charcoal.
24.578 grains in the gallon	2.074	3.757	8.426	15.28

But, as might have been anticipated from the well-known power of charcoal to remove organic principles from solution in water, its superiority over sand is more especially observable in this respect; no weighable quantity of organic matter being separated by the sand, whilst 15 per cent. of the quantity present was removed by the charcoal.

Nevertheless the case is quite altered when more impure water is filtered through the same medium; for instance, it will be remembered that sand does remove organic matter from water when the quantity present is somewhat greater. Thus, in Tables I., II., and III., it is shown that at Chelsea, where the quantity of organic matter present in the water rose to 2.375 grs. in the gallon, then the sand removed 20.46 per cent.; when the quantity present amounted to 4.05 grs., 66.66 per cent.; and lastly, when to 9.909 grs., no less than 95.23 per cent. was removed!

Now this is a most striking and important result in a hygienic point of view. The evil consequences said to result from the water-supply of London at present in use are mainly attributed to the organic matter present in the water; but these analyses show that the more impure the water (within certain limits), the greater is the power of porous filtering media to remove these impurities, probably from the more perfect contact between the filtering medium and the impurities present. It is obvious that this would not go on *ad infinitum;* it must not be supposed that I wish it to be inferred that the more organic matter there is present in a water, the more would necessarily be removed by sand filtration; quite the contrary, it is

highly probable that if the quantity had increased much beyond what was contained at the time of the performance of these experiments, a considerable amount might have passed through unrestrained; all I wish to be understood is, that *within the limits of the quantities present* when these experiments were made, *sand was found incapable* of removing any appreciable quantity of organic matter when the amount originally present in the water was *exceedingly small:* but that in the same ratio as the quantity present increased, the *proportion separated rose.*

Now the power of charcoal, I believe, increases in a similar manner; but no experiments could conveniently be made on the large scale at Chelsea to enable me to draw a strict comparison between the effects of sand and charcoal upon the more impure water there, similar to what had been made at Kingston with the comparatively pure water; therefore, to enable me to adduce experimental evidence on this point, a comparative experiment was made on the small scale with an artificially prepared impure water.

This water was prepared as follows:—To the sample of Thames water collected at Kingston on the 8th of October, 1855, cow-dung and garden mould were added, in the proportion of 4 oz. of solid cow-dung (without straw) and 4 oz. of garden mould to two gallons of the water; the whole was allowed to digest for a week, being frequently shaken during this period; it was then allowed to settle for twelve hours, and the supernatant fetid fluid poured off and submitted to examination. It was found to contain in the gallon—

Total residue	71.772 grs.
Organic matter	29.308 "
Mineral matter	42.468 "

And the results obtained by filtration respectively through sand and charcoal are contained in the following Tables:—

TABLE VII.—*Action of Vegetable Charcoal on artificially impure Water.*

	Original constituents.	Present after filtration.	Amount separated in grains in the gallon.	Per-centage ratio of matter separated.
Total residue	71.772	33.86	37.912	52.82
Organic matter	29.308	3.50	25.808	88.05
Mineral Salts	42.464	30.36	12.104	28.26

TABLE VIII.—*Action of Sand.*

	Original constituents.	Present after filtration.	Amount separated in grains in the gallon.	Per-centage ratio of matter separated.
Total residue	71.772	70.23	1.542	2.14
Organic matter.....	29.308	27.85	1.458	4.97
Mineral salts	42.464	42.38	0.084	0.197

It must be borne in mind that these two experiments, being made only on the small scale in the laboratory, though strictly comparable with each other, do not admit of comparison with any of the others; they serve only to demonstrate how far greater is the power possessed by charcoal of removing organic matters from solution than that of sand, though the difference in their action on soluble inorganic salts is less marked.

Another point of distinction between the effects of charcoal and sand upon the Thames water at Kingston was this—that whereas the efficacy of the sand filter continued increasing even up to the conclusion of the experiment, the amount of impurity separated by the charcoal arrived in all cases at a maximum after a certain number of hours, and then began to decrease, as will be more perspicuously shown by the following Table:—

TABLE IX.—*Showing the period of maximum efficacy of the several filters.*

Amounts of total residue originally present in each case.	Number of hours' action of the filter.	Amount separated in grains in the gallon by			Per-centage ratio of quantity separated by		
		Sand.	Charcoal in granules.	Charcoal in lumps.	Sand.	Charcoal in granules.	Charcoal in lumps.
grs.	hrs.						
24.578	23	0.708	2.868	...	2.88	11.66	
23.949	67	...	...	0.281	...	...	1.17
23.949	91	...	...	1.873	...	...	7.82
23.949	115	...	...	0.937	...	...	3.91
24.578	120	0.888	2.934	...	3.613	11.93	
23.949	139	...	...	0.538	...	...	2.242
24.478	240	2.044	3.757	...	8.316	15.28	
24.478	376	2.071	3.204	...	8.426	13.03	

Lastly, these experiments upon the comparatively pure water of Kingston show that CHARCOAL, *as well as sand*, is capable of separating *mineral* salts from *solution* in water, as is evident by an inspection of the foregoing Tables.

The following is a brief summary of the most important results of this investigation:—It has been shown,—

1st. That sand, charcoal, and probably other porous media, possess the very peculiar property of removing, not merely suspended impurities, but even dissolved salts from solution in water.

2nd. That charcoal enjoys pre-eminently the power of abstracting organic matter from solution: but that even sand likewise is capable of effecting the same result, though to a far less extent.

3rd. That these powers, possessed by both these media, increase in intensity to a certain extent with the degree of impurity of the solution.

4th. That these properties of porous media have important bearings upon hygienic science, agricultural principles, and geological phenomena.

The reader will not fail to have noticed, by the various analyses given above, great variations in the composition of the river-water, between the two points at which experiments were made, viz., at Chelsea and Kingston as well as at the different seasons of the year. To a number of analyses made duriug the year since May, 1855, I hope to draw attention in a subsequent paper as elucidating these facts.

SOLUBILITY OF IRON AND OF GELATINOUS PROTOXIDE OF IRON IN COD-LIVER OIL AND OTHER FIXED OILS.

BY M. VEZU.

1. Metallic iron and gelatinous protoxide of iron dissolve in the cold in cod-liver oil.

2. Water is, in most cases, required to promote the solution, excepting with iron reduced by hydrogen, which dissolves without such aid.

3. Oil of sweet almonds dissolves iron, and acquires a mahogany red colour.

4. Olive oil, castor oil, &c., dissolve iron without becoming sensibly changed in colour.

5. Oxide of iron dissolves with more facility, in proportion as it has been more recently prepared, is humid, and has not been exposed to the air.

6. Iron dissolved in oil is always found in the state of protoxide.

7. Ether dissolves these oils, just as it would the same oils in their natural state.

8. The other oxides of iron are scarcely at all soluble in oils, either with or without the aid of heat.—*Repertoire de Pharmacie.*

DECAY OF GUTTA PERCHA.

From the reports of Mr. E. Highton on the state of the underground wires of the British Electric Telegraph Company, published in the *Journal of the Society of Arts*, it appears that wherever the wires had passed near the roots of oak trees they had failed, whilst in other parts, only a few yards distant, they were perfectly sound. On examining the soil a whitish looking plant was detected, resembling the spawn of the mushroom, or some other fungus; the plant had spread over and around the wooden trough, covering it with a whiteness resembling whitewash, and wherever it had touched the gutta percha wires the gutta percha was rotten; a yellowish-green fungus, of which this plant was supposed to be the spawn, was found growing luxuriantly under the oak, but not under any other tree. The plant possesses a powerful odour, at once detected on breaking the soil. The presence of the plant and the decay of the wires were found coincident; the absence of the plant and a most perfect state of the wires coincident also. It was found that the wires in one locality passing under two oak trees were not injured; in this case no fruit of the fungus could be found in the soil, although plentiful under other oak trees in the neighbourhood. With reference to the decay of gutta percha in iron tubes it was found at Winslow that the wires through the entire lengths of the iron pipings were in a state of decay, whilst the wires in the wooden boxing were found perfect. The decay in this case appears to be produced by a cause entirely different from that under the oak trees. The following is the result of Mr. Highton's investigation:—

With reference to my experiments on the action of the mycellium of a fungus on gutta percha, I have for some months been growing one of the class called *agaricus campestris* in contact with gutta percha.

I find as the result that the mycellium of this fungus does rapidly destroy the insulating properties of gutta percha; and in fact it appears to decompose entirely this vegetable gum. I send a sample showing the decay.

I am trying further experiments, an account of which I hope ere long to lay before the Board.

A few days ago I examined a spot near Canterbury, where the gutta percha of the wires had entirely decayed.

The soil was pure, clean, sharp, reds and, and there appeared nothing in such soil to induce decomposition.

But at that spot I found a young oak tree, which could only derive its nourishment from the ground through which the wires passed. And upon these roots, both living and dead, I found what I believe to be the mycellium of a fungus, the same as that which I discovered under the oak trees at Berkhampstead.

I send with this some of those roots upon which the fungus can be distinctly traced. The odour arising from that fungus appears to be identically the same as that from the fungi at Berkhampstead.

Ten yards distant was also another young oak tree, and at that point the gutta percha of the wires had also decayed. I will again communicate with the Board when I have made further investigations, but at present I feel bound to say that the presence of the mycellium of a fungus, and the decaying of the gutta percha covering of the telegraphic wire, being so constantly associated together, I can come to no other conclusion than this—viz., that the mycellium of a fungus will cause decomposition in gutta percha, and probably in most other vegetable productions.

DESTRUCTION OF THE GUTTA PERCHA TREES IN SINGAPORE.

A correspondent of Hooker's *Journal of Botany* makes the following observations on the destruction of the gutta percha trees in Singapore:—

"I have commenced to collect all the different guttas that are brought to Singapore in the Malay and Bugis prahus, and when I have succeeded in procuring specimens of the principal part of them, I will send them to you.

"Many of those passing under different names, however, are merely different qualities of the same stuff, or prepared in a different manner. Seeds of the gutta percha tree, and flowering specimens of the plant, I am afraid I shall not be able to procure in Singapore, as we have nothing but very small trees left in the island now; all those old enough to yield even a very small quantity of sap having been cut down

by the Malays; but Sir James Brooke, who has been staying here, has promised to send me both from Sarawak, where there is no difficulty in procuring them, there being abundance of full-grown trees still.* The trees are always cut down here to procure the sap, though I have no doubt it is very bad policy to do so, since by tapping them a good quantity of sap easily runs, and it might be repeated again after giving the trees a reasonable time to recover. Natives will never consider any future advantage, their great object being to get the largest quantity at a time. Their argument, too, that unless the trees were private property, and could be looked after, it would be impossible to protect them from one's neighbours, is very true; and this would be quite out of the question in the extensive forests where the gutta trees are found. At some future period, I have no doubt the gutta percha tree will be quite extirpated in all the countries about Singapore. Being always cut before it has a chance of seeding, it cannot continue to exist unless the price rises to such an extent as to make it worth while planting the tree on private property.

"It is to be found (the identical species?) over nearly the whole Archipelago that is inhabited by the Malay race, but as far as I know does not extend further to the east. True gutta percha is called *gutta tabban;* most of the other guttas are varieties of caoutchouc. Neither the Malays nor the Chinese make much use of gutta percha, as far as I have seen. Knife-handles and small buckets seem to be the principal uses they put it to; it is sometimes made into bands for tying things with also, but I have not often seen it used in this way.

"The quantity of gutta percha exported from Singapore in 1855 was about 1900 tons, but this year it will be much short of that amount, probably not over 1500 tons. Its present price is 22 dollars per picul (133⅓ lbs.) for good quality.

"P.S. The principal other vegetable substances exported from here are gambier, camphor, sago, pepper, coffee, sugar, sapan-wood, mangrove-bark, nutmegs and mace, rattans, canes, cubebs, gum benjamin, dragon's-blood, gamboge, vegetable tallow, vegetable wax, gum copal, cloves, tapioca, arrowroot, rice, cassia, gum elastic, sea-weed, sandal-wood, galingals, rhubarb, cutch, ginger, teel-seed, ebony, cocoa-nut oil, wood oils, betel-nut, cardamoms, China-root, timber, besides others which escape my memory at present."

SALE OF POISONS, &c., BILL.

As amended by the Select Committee.

ARRANGEMENT OF CLAUSES.

COMMENCEMENT OF ACT, sect. 1. 14 and 15 Vict., c. 13, repealed, 2. Definition of poison, 3. Poison to be sold only to a person of full age, in presence of a witness of full age, and upon the production of a certificate, 4. Entries to be made regarding the sale of poisons, 5. Covering required on poison sold in a solid state; colour and form of bottles of liquid poison, 6. Colourless solid poisons sold must be mixed with soot or indigo, 7. Colourless liquid poisons must be coloured by archil, 8. *After 185 no poison to be sold without a licence except by a legally qualified medical practitioner*, 9. *Appointment of examiners*, 10. *Applicants for licences to be examined*, 11. *Persons now carrying on business as Druggists to be entitled to licences without examination, such licences not to continue in force beyond five years*, 12. *Fees on grant of licences and on examinations*, 13. *Fees may be reduced by Order in Council*, 14. Gift of poisons to be subject to the provisions applicable to sales, 15. Prescriptions exempted, 16. Poisons to be distinctly labelled and kept apart in the shop or dispensary; poisonous medicines for external use to be put in coloured bottles of a peculiar shape, 17. *Examiners empowered to enter the shops of Druggists and places where medicines are sold by retail*, 18. Penalty for offending against the Act, 19. *Extent of Act*, 20. Schedules.

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* "The Borneo gutta percha, we believe, is much less esteemed than that of Singapore, and from specimens of the leaves that have been sent us by Sir James Brooke, it would appear that the species is different from the true gutta percha. The veritable *Isonandra gutta* has, however, recently been detected in Sumatra, and a specimen has been sent to us by our excellent friend Professor de Vriese, of Leyden.—ED."

A BILL (AS AMENDED BY THE SELECT COMMITTEE) INTITULED AN ACT TO RESTRICT AND REGULATE THE SALE OF POISONS.

Whereas the existing restrictions on the sale of arsenic have been found to be insufficient, and the unrestricted sale of other poisons facilitates the commission of crime and occasions frequent fatal accidents: Be it enacted by the Queen's most excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:

I. Save where herein otherwise provided, this Act shall commence and take effect from and after the day of

II. The Act of the session holden in the fourteenth and fifteenth years of Her Majesty, chapter thirteen, "to regulate the sale of arsenic," shall be repealed *with respect to England.*

III. In the construction of this Act the word "Poison" shall mean any drug or substance mentioned or referred to in the Schedule (A) to this Act.

IV. No person shall sell any poison *to any person who is unknown to the person selling the poison*, unless the sale be made in the presence of a witness of full age who is known to the person selling the poison, and to whom the purchaser is known, and *who signs his name, together with his place of abode, to such entries as are required by this Act, before the delivery of the poison to the purchaser, and no person shall sell poison to any person other than a person of full age*, unless there be produced and delivered to the seller, before such sale, a written certificate, signed by a householder, with his name and residence, stating that he knows the person for whose use the poison is required, and that he believes it may be safely supplied to him, and all such certificates shall be carefully preserved by the seller in the order in which they are received.

V. Every person who sells any poison shall forthwith, and before the delivery of the same, enter or cause to be entered, in a fair and regular manner, in a book or books to be kept for such purpose in the form set forth in the Schedule (B) to this Act or to the like effect, a statement of such sale, and the following particulars:

1. The date of the sale and delivery of such poison;
2. The name, surname, and address of the person to whom the poison is delivered;
3. The name and quantity of the poison sold;
4. The purpose for which such poison is stated to be required;

Into all of which circumstances the person selling such poison is hereby required and authorized to inquire of the purchaser, before the delivery of the poison; and such entries shall in every case be signed by the person so making the same and by the person to whom the poison is delivered, and *(where the sale is required to be made in the presence of a witness) shall also be signed* by the witness, who shall add his place of abode.

VI. *No poison sold in a solid state, except opium, shall be wrapped in paper only without a secure covering either of tinfoil or of sheet gutta percha, and all poison sold in a solid state shall have the vessel, box, wrapper, or cover, as the case may be, containing such poison distinctly labelled with the word "POISON" in conspicuous capital letters, and with the name, surname, and address of the person selling the poison; and when any poison is sold in a liquid state, the bottle containing such poison shall be of blue-coloured glass of a triangular shape, and shall be labelled in conspicuous capital letters "POISON," and with the name, surname, and address of the person selling the poison, and shall have the word "POISON" cast or moulded in raised letters in the glass on the side of the bottle.*

VII. No person shall sell any colourless poison whatsoever in a solid state, unless the same be before the sale thereof mixed with indigo in the proportion of one part by weight of powdered indigo at the least to thirty parts by weight of the poison, save where such poison is stated *by the purchaser* to be required for some lawful purpose for which such admixture would, according to the representation *of such purchaser*, render it unfit, and in that case such poison may be sold without such admixture.

VIII. No person shall sell any colourless poison, *except chloroform*, in a liquid state, unless the same be before the sale thereof mixed with such a quantity of a strong solution of archil, not being less than ten minims by measure to one fluid ounce of the poison, as will give the fluid a decided colour, save where the poison is stated *by the purchaser* to be required for some lawful purpose for which such admix-

ture would, according to the representation *of such purchaser*, render it unfit, in which case such poison may be sold without such admixture.

IX. *After the day of no person other than a legally qualified Medical Practitioner shall sell any poison without a licence to vend drugs granted under this Act.*

X. *For the granting of licences and the examination of persons desirous of obtaining licences under this Act, six Examiners shall be appointed from time to time, three of whom shall be appointed by Her Majesty under her sign manual, and the College of Physicians of London, the Society of Apothecaries of London, and the Pharmaceutical Society of Great Britain shall severally appoint one of the remaining Examiners; and every Examiner appointed by Her Majesty shall hold office during her Majesty's pleasure, and every other Examiner shall hold office for such term as the body by whom he is appointed shall think fit and direct.*

XI. *The Examiners shall sit in London or elsewhere in England, as they may from time to time think fit, and such Examiners, or any three of them, shall from time to time examine persons applying to them for the purpose of ascertaining their proficiency in the branches of knowledge requisite to enable them safely to vend drugs; and any person who shall pass the examination to the satisfaction of the Examiners conducting the examination, or the majority of them, shall be entitled to a licence to vend drugs, which shall be signed by the Examiners by whom he may have been examined, or by any two of them.*

XII. *Every person having carried on for one year or upwards before the passing of this Act the business of a Chemist and Druggist, or of preparing, dispensing, and vending drugs and medicines by retail, shall, upon satisfying the Examiners, or any two of such Examiners, of the fact of his having for the time aforesaid carried on such business, be entitled, without any examination, to such licence to vend drugs, but no such licence granted without examination shall be in force for more than five years after the passing of this Act.*

XIII. *There shall be paid to such persons as the Examiners shall appoint to receive the same, upon the grant of each licence by such Examiners (save where such licence is granted after examination), a fee of , and for admitting any person to be examined, save where such person has previously received a licence which will cease to be in force after the expiration of five years after the passing of this Act, the like fee of , and the monies received in respect of such fees shall be applied in the payment of such allowances to the Examiners in respect of their attendances in the grant of licences and in examinations, and of the expenses incident to the duties to be performed under this Act, as the Examiners, with the sanction of the Secretary of State, shall from time to time direct.*

XIV. *Provided always, that it shall be lawful for Her Majesty, with the advice of Her Privy Council, from time to time to reduce the fees payable as aforesaid to such respective amounts as to Her Majesty, with such advice as aforesaid, may seem fit, and every Order in Council reducing the said fees, shall be published in the* London Gazette.

XV. If any poison be given or delivered *by any retail dealer in drugs* (whether gratuitously or in exchange for any other article or thing) to any other person, such gift or delivery shall for the purposes of this Act be deemed a sale, and all the provisions and penalties of this Act applicable to a sale of poison shall apply to such gift and delivery, and for the purposes of this Act the person giving or delivering the poison shall be deemed the seller, and the person to whom the same is given or delivered shall be deemed the purchaser.

XVI. The provisions hereinbefore contained shall not extend to the sale of any medicine required to be made up or compounded according to the prescription of a legally qualified Medical Practitioner, or made up or compounded by a legally qualified Medical Practitioner, *or by a Veterinary Surgeon having a licence or diploma from the Royal College of Veterinary Surgeons, or to the sale of any patent medicine.*

XVII. And whereas it is expedient that as well members of the Medical Profession as others should be subject to regulations in respect of the keeping of poisons and the delivery of poisonous preparations intended for external use:

Every person who keeps for sale by retail any poison, and every Apothecary, Surgeon Apothecary, or other Member of the Medical Profession, and every officer of any hospital, infirmary, or dispensary, who has under his custody any poisons, shall keep all such poisons separated from all other drugs and medicines, and distinctly labelled with their names, *and shall keep in bottles of blue-coloured glass all liquid poisons and all other poisons usually kept in bottles:*

All liquid medicines intended for external use, and consisting of or containing any poison, shall be sold and delivered in bottles of blue-coloured glass, and of a *triangular* shape, and labelled in conspicuous capital letters "POISON" or "FOR

EXTERNAL USE;" the word "POISON" or the words "FOR EXTERNAL USE" being also cast or moulded in raised letters in the glass on the side of the bottle.

XVIII. *The Examiners under this Act, or any two of them, or any person or persons appointed by writing under the hands of two or more of such Examiners for this purpose, shall have full power from time to time at reasonable times in the daytime to enter and search any shop or place where any drugs or medicines, simple or compounded, are sold by retail, to ascertain that the provisions of this Act concerning the keeping of poisons separate from other drugs and the labelling of the same are duly observed.*

XIX. If any person sell any poison, save as authorized by this Act;

Or deliver the same without having made and signed the entries hereby required on such sale, or without having obtained such signatures to such entries as are required by this Act, or without complying with all the provisions of this Act in relation to the sale of such poison;

Or if any person purchasing any poison give false information to the person selling the same in relation to the particulars which such last-mentioned person is hereby authorized to inquire into of such purchaser, or procure by a false certificate or other false pretence such poison, or procure by false pretences a certificate for the purchase of poison;

Or if any person sign his name as aforesaid as a witness to a sale of poison to a person unknown to the person so signing as a witness;

Or if any person sell or deliver any liquid intended for external use, and containing any poison, otherwise than in such a bottle of coloured glass as aforesaid, and labelled as aforesaid;

Every person so offending shall for every such offence, upon a summary conviction of the same before two justices of the peace, be liable to a penalty not exceeding pounds for the first offence, and to a penalty not exceeding pounds for the second or any subsequent offence;

And every person so convicted of such offence more than twice shall for the third and for every subsequent offence, upon a summary conviction of the same before two justices of the peace, be liable to a penalty of ;

And if the person selling or delivering any poison, or any liquid intended for external use and containing poison, without complying with all the provisions of this Act in relation to the sale or delivery thereof, be an apprentice or servant acting on behalf of his master, then the master on whose behalf the sale or delivery is made, as well as such apprentice or servant, shall be liable to the penalty imposed by this Act in respect of the offence.

XX. *This Act shall extend only to England.*

Schedules to which this Act refers.

SCHEDULE (A).

Arsenic and its compounds. Corrosive sublimate and its solution. The poisonous vegetable alkaloids and their salts. Prussic acid. Cyanides of potassium. Essential oil of bitter almonds, and any mixture containing it. Cantharides. Aconite and its preparations. Opium, crude or in tincture, extract or powder. Chloroform. Oxalic acid and salt of sorrel. Nux vomica. Tartarized antimony and its solution. Coculus indicus.

SCHEDULE (B).

Date of Sale and Delivery.	Name and Surname of Purchaser.	Purchaser's Place of Abode and Occupation.	Name and Quantity of Poison sold.	Purpose for which required.	Name of Person giving Certificate.
Saturday, Sept. 26, 1856. 10 30 A.M.	*Henry Holmes*	27, *Snow's Fields, Bermondsey, Shoemaker.*	*Arsenic* ½ *lb. Coloured Blue with Indigo.*	*For destroying Rats and Mice.*	*James Paget, Incumbent of St. Olave's, Bermondsey.*

(*Signature of Purchaser.*)
HENRY HOLMES.

(*Signature of Witness.*)
JOHN SIMS,
26, Tooley Street,
Southwark.

(*Signature of Vendor.*)
SAMUEL EDWARDS,
Licenced Druggist,
18, King Street,
Southwark. }*

* Address unnecessary if placed on article sold.

FATAL POISONING BY MISTAKE.

Mr. W. W. Munckton, coroner for West Somerset, held an inquest at Hartrow Manor, near Taunton, on Friday, Aug. 7, on the body of Mrs. Anne Escott (relict of the late Mr. Bickham Escott, formerly M.P. for Winchester), who died on Wednesday from poison administered by herself in mistake for a dose of medicine. It appeared that the deceased had been ill for several days, and was attended by Mr. Henry, a surgeon of Stogumber, who found her suffering from fever, and prescribed for her accordingly. On Wednesday morning a bottle containing solution of acetate of morphia (which Mrs. Escott was in the habit of taking in small doses occasionally) stood on the mantelpiece in her bedroom, close by the medicine bottle, which was the same kind of phial as that containing the morphia; and in the absence of the nurse the deceased took a quantity of the latter, thinking she was taking the medicine as prescribed. The unfortunate lady discovered her error immediately, and as the servant entered the room deceased cried out, "Oh! I have taken the wrong medicine." Mr. Henry, who happened to be in the house at the time in conversation with Miss Escott, was summoned to the room, and he applied the stomach-pump, emetics, &c., but without effect, and the patient gradually sank, and expired in a few hours. The jury returned a verdict to the effect that "the deceased died by poison taken by herself in mistake."—*Times*, Aug. 11.

DEATH FROM AMYLENE.

There has been another death from the new anæsthetic, amylene. It occurred on Thursday, Aug. 6, at St. George's Hospital. Dr. Snow administered the agent. The patient was a man who had a fatty or some other benign tumour on the back, and it was in consequence of the operation about to be undertaken for its removal that the anæsthetic was administered. We are not yet informed what condition of the organs of circulation and respiration were discovered at the autopsy. This is now the second death from amylene. It is incumbent upon Dr. Snow to show that the proportion of deaths from amylene has not exceeded those from chloroform. The statistics are certainly narrow as yet, but we are very doubtful whether chloroform had *two* victims in so short a time and after so few experiments. We trust that a full report upon the subject will appear without delay, for some people are halting between two opinions, and the profession has an immediate interest in being able to judge of the comparative value of the rival anæsthetics.—*Lancet.*

THE APPLICATION OF ANÆSTHETICS.

At the last sitting of the French Academy of Sciences, M. Heurteloup read a paper on the application of anæsthetics. When ether or chloroform is administered by means of a sponge held at a short distance from the nostrils there is no ascertaining the quantity inhaled, since the breath of the patient or the slightest draught may cause the vapour to deviate. Moreover, in spreading and mixing with the ambient air it may cause convulsive coughs and other inconveniences; and sometimes, after long and fruitless efforts to produce stupefaction, this effect is suddenly obtained to an alarming degree, ending, perhaps, in death. All this, M. Heurteloup observes, is owing to the impossibility, under the present system, of regulating the application of the anæsthetic, to remedy which inconvenience he proposes an apparatus of his own invention, consisting of a glass tube, having each of its orifices closed with cork, into which another tube of a smaller diameter is inserted. One of the latter communicates by means of a flexible tube with a reservoir containing chloroform, which is blown into the larger tube by a small pair of bellows. The chloroform passes thence into the tube at the opposite extremity, which ends in a point, leaving the smallest possible aperture for the escape of the vapour. It is through this aperture the patient inhales the anæsthetic, which issues in a conical form, expanding as it rises, and mixing with the air; so that as the apparatus is brought nearer to or removed from the nostrils of the patient the power of the anæsthetic is increased or diminished at will, and the operator may stop or resume its emission by stopping or renewing the action of the bellows.—*Times*, Aug. 13.

DEATH OF MR. MARTIN, CHEMIST, UPPER CLAPTON.

On Monday, Aug. 10, Mr. Baker, the coroner, held an inquiry at the Three Compasses, Dalston, on the body of Mr. Thomas Martin, a chemist, of Upper Clapton. From the evidence of Shaw, a porter at the Hackney station of the North London Railway, it appeared that some two minutes after the ten P.M. train had passed through the station on the previous Friday their attention was attracted to faint cries of distress.

With lanterns the porters got on the line, and proceeded in the direction of the cries, and on arriving some forty or fifty yards from the station platform they came up with a gentleman (the deceased), who was lying on the line with both legs broken and mutilated, resting on the metals. Although in great agony, he was perfectly sensible, and explained to them how he met with the accident, saying that it was entirely his own fault; that finding the train moving from the station he attempted to alight from the carriage, but was thrown under the train. He was immediately placed on a stretcher and conveyed to the German Hospital at Dalston, where he expired on Sunday night. The jury returned a verdict of Accidental Death. Mr. Martin was a young man much respected, and a Member of the Pharmaceutical Society.

SECRET MEDICINES AND PUFFING.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—The *Pharmaceutical Journal* very properly denounces quackery and puffing of secret nostrums as derogatory to the Pharmaceutist, who must henceforth be a man of education, and who is called to a higher and nobler occupation than the sale and puffing of some "panacea," some "elixir," as Mr. Ince terms it, which is to cure *all* "the ills which flesh is heir to," thereby reducing himself to the level of a Holloway, a Du Barry, or a "Blue-bottle" Druggist.

But what can the public think, what must it think, when, with the Journal expressing itself that "the adoption of the style of advertisement usually resorted to by the vendors of quack medicines is undesirable and derogatory to the character of Pharmaceutical Chemists, and should be discouraged by those who desire to see our body recognized as a branch of the profession," and with scientific meetings being held, and subjects discussed in a creditable manner, and scientific papers read, Members of the Council go home and puff away right heartily in the newspapers, as in the enclosed advertisement—in the present instance in connexion with a medical man, and all about some stuff which is "the most effective medicine ever discovered," "superior to any other remedy in use," "most urgently to be recommended," and which is to cure "rheumatism and consumption," "neuralgia and hemorrhage," "croup and diarrhœa," besides "inflammatory and nervous affections," and even dread "cholera" itself, and which "*succeeds when all other tried remedies fail?*" What an invaluable medicament!—what a boon to humanity!. Doubtless the public may fail to discover any real difference between Professor Holloway and the author of such an advertisement.

Not surely by such means did "Battley's Liquor Opii" gain its world-wide renown.

No objection may exist against advertising, but advertising need not of necessity be thoroug-hgoing "puffing."

Let the advertiser take the hint given in all good-will, and discontinue a proceeding which brings discredit upon himself and his Pharmaceutical brethren. He appears to be ashamed of the advertisement himself, for he has merely given his name and address, but *no occupation*—not "*Pharmaceutical Chemist.*" Let us be thankful he has spared us that. I remain, Sir, your obedient servant,

A MEMBER OF THE SOCIETY.

[We have lately received several communications on this subject, and endeavoured in our last number to explain the general principles involved in the question. A Society or a profession can do no more than lay down certain rules in the form of recommendation, for the adoption of its members. To what extent such rules are complied with, must depend on the will and pleasures of individuals, there being no court of ethics for the decision of such questions.—ED.]

PATENTS FOR COATING PILLS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—It would have been only fair when you printed my patented process for coating pills, that you should have taken your extract from the *complete*, and not the *provisional* specification. After describing the process in the *complete* specification, the words run as follows :—"I claim the coating of pills and boluses with a gum or resin varnish insoluble in water." That claim was printed as the law directs, in the *London Gazette*, and no opposition being entered, the patent was duly sealed. I am now anxious to try its validity with any opponent, but it must be with one capable of paying costs when defeated, and who would not be able to plead that he was domiciled in France. I am, Sir, your obedient Servant,

Brighton, August 20th, 1857. ARTHUR H. COX.

BOOKS RECEIVED.

MANUAL OF TECHNICAL ANALYSIS: *a Guide for the Testing and Valuation of the various Natural and Artificial Substances employed in the Arts and in Domestic Economy.* Founded upon the *Handbuch der Technisch-Chemischen Untersuchungen* of Dr. P. A. Bolley. By BENJAMIN H. PAUL, Ph. D., F.C.S., &c. London: Henry G. Bohn, York Street, Covent Garden. 1857.

A KEY TO THE ADULTERATION OF OUR DAILY FOOD. Compiled by WILLIAM DALTON. London: G. Marlborough and Co., 4, Ave Maria Lane. 1857.

TO CORRESPONDENTS.

T. M.—Iron Cement. Iron borings, coarsely powdered, 5 lbs.; powdered sal ammoniac, 2 oz.; sulphur, 1 oz.; water sufficient to moisten it. If sufficient time be allowed, it sets more firmly without the sulphur.—BEASLEY.

S. W. (Manchester) and *A. B.* (Hastings) should send their names and address, when the instructions will be forwarded.

A. P. S. (Cheltenham).—It would not be correct to use *Creta Precipitata* in making *Mistura Cretæ Composita.* See Dr. Pereira's article on the subject, vol. viii., p. 412.

J. D. G. (London).—(1.) Yes; hyposulphite of soda may be made by decomposing hyposulphite of lime with carbonate of soda.—(2.) In cases of poisoning by cyanide of potassium, a weak solution of sulphate of iron would decompose the salt, but the action of the poison is generally too rapid to admit of the use of this antidote.

A Pharmaceutical Chemist (York).—(1.) Proof spirit freezes at 7° below zero.—(2.) Methylated spirit should not be used for dispensing.—(3.) Yes.—(4.) The Pharmacy Act prohibits the use of the title Pharmaceutical Chemist or Pharmaceutist by those who are not registered as such or Members of the Society, but does not interfere with the practice of pharmacy.

P. (London).—(1.) Goodall's Patent Grinding and Levigating Machine (Derby), figured vol. xiii., page 212.—(2.) Powdered bones may be obtained of any bone crusher.

M. H. (Southampton) and *A. W.* (Colchester).—(1.) Yes. See vol. xv., page 102.—(2.) Royle's *Materia Medica*, price 12*s.*

J. D. (Isle of Wight).—Lobelia Inflata in small doses acts as a diaphoretic and expectorant, but in excessive doses it is a narcotic, according to Pereira.

L. N. R. (Reading).—Seidlitz powders are specially exempted from the Patent Medicine Duty.

"*Push Forward.*"—The subject has been attended to.

A Correspondent (Derby) encloses two fragments of newspapers containing reports of accidents from poison attributable to ignorance, the vendors not being Chemists and Druggists. The names and dates of the newspapers being cut off, and the letter anonymous, the cases are not sufficiently identified for publication.

Arsenic as a Cosmetic.—We have received an extract from the *Birmingham Mercury* on this subject, containing some curious statements very undesirable for publication, as having a tendency to furnish a pretext for the purchase of arsenic.

Mr. Anderson (Musselburgh) has sent an extract from a newspaper, being a letter signed "A Pharmaceutical Chemist of Fifteen Years' Standing," in which the author offers suggestions as to the provisions of a Bill which he recommends for restricting the sale of poisons.

Mr. Hornsby (Brighton).—So much of our space is already occupied with the subject, that we are obliged to omit the letter.

Instructions from Members and Associates, respecting the transmission of the Journal, to the Secretary, 17, Bloomsbury Square, before the 20th of the month.

Advertisements (not later than the 23rd) to Mr. CHURCHILL, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XVII.—No. IV.—OCTOBER 1st, 1857.

THE POISON BILL—THE MEDICINE STAMP AND LICENCE ACTS—AND RANDOM PRESCRIBING.

The morbid nervousness which prevails at the present time about the public safety leads its votaries into some rather strange inconsistencies. The true and legitimate object of the Poison Bill is to protect the public in England against the injury arising from crime and carelessness in the use of dangerous drugs. Patent medicines are excluded from the operation of the Bill; yet many of these contain powerful and poisonous ingredients, in a form very convenient for the criminal, and liable to accident in the hands of careless persons. Godfrey's Cordial, Dalby's Carminative, Black drop, and many other well-known patent medicines, besides innumerable nostrums sold under various names—such as Anodyne mixture, Child's Cordial, &c., &c.—are quite as dangerous as the ordinary tincture of opium and other prohibited compounds. But the term "Patent Medicine" is indefinite. If it were understood to apply only to those medicines which are protected by patents, the number is so small as to be unworthy of notice; patent medicines in this sense of the term being almost obsolete. We therefore conclude, of course, that the medicines referred to in the exemption are those to which the Patent Medicine Acts apply, and which cannot be sold without a Patent Medicine Licence.

We frequently have occasion to remind our readers of the conditions under which compounds become liable as Patent Medicines; namely, when prepared by a secret process or formula—when advertised as made exclusively by the original vendor—or when recommended for the relief or cure of any disorder. Any ordinary medicine—even the Pharmacopœia preparations—may be made liable to stamp-duty, and thus come under the Patent Medicine Law, if sold with printed directions and recommendation for the cure or relief of any disorder. Laudanum, for example, or any mixture containing it, if labelled "Anodyne tincture for toothache," or "Sedative mixture for diarrhœa, cholera, &c.," with a stamp affixed, would become subject to the Patent Medicine Laws, and as such exempted from the operation of the proposed Poison Bill. While this affords facilities for evading to any extent the intended precautions against poisoning, the Medicine Stamp and Licence Acts tend in another respect to frustrate such precautions. The most important rule to be attended to with reference to medicines generally, consists in having everything distinctly labelled, and its nature and uses clearly understood. But a careful Pharmaceutist, who with this object uses explanatory labels or papers of printed directions, in which any allusion is made to the nature of the disorders for which the several domestic remedies are applicable, becomes liable under the Medicine Stamp Act, and each preparation so described or recommended is thereupon held to be a patent or quack medicine. This is objectionable to many Chemists, who make it a rule to avoid as much as possible the semblance of quackery, and the only alternative consists in avoiding any written or printed information respecting the nature of the medicines, leaving patients at the mercy of their memories in retaining verbal directions, and with the probability that, when any medicine is wanted on an emergency, the wrong may be taken by mistake for want of explicit printed instructions. Thus the Medicine Stamp and Licence Acts fetter the prudent Chemist in the performance of an important part of his duty, and at the same time let loose upon the public a host of quacks and impostors, who, fortified by the Government stamp and their own unscrupulous impudence, puff into notoriety their so-called specifics, recommending the same remedy for

almost every disease, and inflicting on the unwary an unknown amount of mischief.

But this system, we are informed, must not be interfered with. A considerable amount of revenue is derived from the stamps and licences, and in comparison with this paramount object the public health or safety is a secondary consideration. A pennyworth of laudanum must not be sold without the formality of a witness and six entries in the poison-book; every lotion or liniment, if sold in the ordinary way of business, must be in a blue triangular bottle; but children may be sent to sleep *ad libitum* with Godfrey's Cordial, "Quietness," or "Real Blessing to Mothers," provided always, that the narcotic assumes the form of a quack medicine, and has the stamp affixed as the Act directs.

The habit of random prescribing is another branch of this subject which demands notice, as the following instances will show.

The following prescription was lately brought to the shop of a Chemist and prepared:—

℞ Acid Sulph. ℥viij.
More dicto utend.
Pil. Galb. Co., 2 dâ quaque nocte.
Aug. 29. Mitte vj. J. D.

The Chemist not knowing what instructions might have been given for using the sulphuric acid, took the precaution to label the bottle "Poison." The patient being alarmed, before taking the medicine consulted the doctor, who immediately exclaimed that the medicine would have seriously injured her if it had been taken according to his verbal instructions. The prescription had been written for a particular Chemist, who knew that the diluted acid was intended, and of how many grains the pills should consist. But it was purposely written so indefinitely, that no other Chemist could correctly prepare it. This custom (which is prohibited by law in most Continental states) is adopted occasionally in this country by medical men, who have a pecuniary interest in obliging all their patients to deal at a certain shop.

We lately saw the following prescription, which was written for a poor patient, instructions being given that it was to be supplied in bulk to save expense:—

℞ Pulv. Ipecac. c., ℥ss.
Cap. gr. 5.

The patient forgot how much to take; but fortunately the Chemist saw the danger, and weighed a few five grain doses, instead of trusting to chance.

A Chemist who is duly sensible of his responsibility is not satisfied with merely taking such precautions as the law requires, and no Poison Bill could possibly define in detail what those precautions are. A well-known manufacturing house in Leeds, having an extensive sale for cyanide of potassium, has issued the following caution, which is printed and enclosed with every parcel of the salt when sent out:—

"Caution.—Cyanide of Potassium.—From the numerous fatal accidents which have occurred in various parts of the country from this substance, it appears that its highly poisonous quality is not sufficiently recognized by Photographers. We beg respectfully to impress upon our customers the necessity of keeping both the solid substance and any of its solutions properly labelled, and under their own charge, and also of bearing in mind the personal risk they incur by its use if having any scratches or wounds upon the hands, or if the air of the operating room should become charged with its vapour. In case of accident from the latter cause, or from swallowing any of the poison, removal into the open air, tickling the throat to produce vomiting, cold water thrown upon the head, and smelling at ammonia, should be resorted to until medical aid can be obtained."

This is going further than the provisions of the Poison Bill, which merely require the presence of a witness, and the proper entry of the sale in the poison-

book. This being done, the purchaser is a free agent, and the vendor free from responsibility.

Experience alone points out the liabilities to be avoided and the precautions which are requisite. For example:—A young man has on his counter two bottles, the same size and shape, filled, corked, and tied over. He is searching for labels in the drawer. The Governor passing that way, and observing the two bottles, inquires "What have you here?" Ans. "One is Compound tincture of quinine; the other, Ipecacuanha wine." "Which is the tincture?" "This; I know by the colour." "There is scarcely a shade of difference. Uncork them both, and examine each before pasting on the label; and in future, if you have two bottles to fill with different ingredients, whatever may be their nature, be sure you label the first before you fill the second—never throw away a chance."

THE LIBRARY OF THE PHARMACEUTICAL SOCIETY.

The annual closing of the Library for the purpose of revision affords a convenient opportunity for directing attention to the regulations. We are informed by the Librarian that some of these are not strictly observed, works being detained beyond the specified time, and on collecting the periodicals of the past year for binding, several are wanting, which, according to the rules, should not have been removed from the Library.

Having been commenced as a Library for reference, no provision was made in the first instance for the circulation of the books; but in the year 1852, it having been observed that a comparatively small number of Members were enabled personally to attend, the privilege of taking out books to read was allowed under certain regulations, which were published in the Transactions of the Society for the above year. It was, however, provided that some of the more expensive works, such as are chiefly required for reference, and also the periodicals for the current year, should not be circulated.

The number of Members who have availed themselves of the privilege is not so large as the Council expected, but it is satisfactory to observe that those who have experienced the advantage, appreciate it, as appears from their repeated application for books. It is desirable that the benefit should be still more widely extended, every facility being given for the acquisition of knowledge by Members and Associates, whether residing near the house of the Society or at a distance. It should be observed that Associates and Apprentices requiring books, may obtain them through any Member. This regulation was found necessary on account of the frequent changes of residence of young men prior to their establishment in business, and it is attended with little or no inconvenience, as the parties in most instances reside with Members. A catalogue of the works in the Library may be obtained on application to the Secretary at the house of the Society. As the regulations occupy but little space, they are subjoined for the convenience of our readers. Subsequently to the date of the regulations on the occurrence of the agitation respecting early-closing, and the expression on the part of the young men of great desire for the opportunity for study and improvement, arrangements were made for opening the Library in the evening from eight until half-past ten. Many of the shops in the neighbourhood, and in the metropolis generally, having been closed at an earlier hour with this object, it was expected that the Library would have been inconveniently crowded with young men eager in the pursuit of knowledge. This, however, has not been the case.

REGULATIONS OF THE LIBRARY.

(Vol. XI. No. 8, Feb. 1852, page 344.)

1. The Library shall be open from half-past Nine until Five o'clock daily, excepting Saturdays, and the period during which it is closed for annual revision.

2. Members of the Society may obtain books on making personal or written application for them, but no Member shall have more than two volumes at a time, nor shall he keep any book for a longer period than fourteen days. But when a book is returned by a Member, it may be borrowed by him again provided it has not been bespoken by any other Member. Books which have been bespoken shall circulate in rotation, according to priority of application.

3. The scientific journals shall not be circulated until the volumes are completed and bound. Works containing valuable plates, and a few standard works of reference, which are distinguished in the Catalogue by the mark (*), shall not be circulated.

4. Members retaining books longer than the specified time shall be subject to a fine of one penny per day for each volume so retained. If any book be retained by a Member for three months, and be not returned after written application has been made for it, the Council may order it to be replaced, and charge the Member in default with the amount thus incurred in addition to the fine. If any book, when returned by a Member, is found to have been damaged during the period such Member has had it, a fine equivalent to the injury shall be paid by the Member.

5. The Library shall be closed for a fortnight once a year, to admit of the revision of the books.

INDEX TO FIFTEEN VOLUMES OF THE PHARMACEUTICAL JOURNAL.

This index is now completed. It occupies rather less space than had been calculated, the contents having been more condensed in the arrangement. It is not a mere transcript of the index of each of the fifteen volumes combined in one, but has been entirely recomposed, with a new and complete classification of subjects as well as authors. On reference to any given subject, every article on that subject is distinctly stated, and all the papers or lectures by each author are enumerated under his name. All the information respecting the Medicine Stamp and Licence Acts, the Sale of Spirit of Wine, the Pharmaceutical Meetings, the Pharmacopœias, Cases of Poisoning, the Progress of Legislation on various subjects relating to Pharmacy, &c. &c., may be found under their several heads; and all the Formulæ and Scientific Papers which we have published from time to time are referred to in their several places in the alphabet. The titles of the Leading Articles, which are given in the order in which they appeared, occupy nearly seven pages, and convey a kind of chronological history of the progress of the Pharmaceutical Society, and the subjects prominently engaging attention during the period.

To those who retain the Journal, and are in the habit of using it as a work of reference, the General Index will be found very convenient, and will save much time which would otherwise be lost in searching through one volume after another for information, the date of which is forgotten; and if we may judge from the frequent repetition of the same questions by different correspondents, who have been fully answered in previous numbers of the Journal, we may hope that the facility now afforded for reference will be appreciated.

In consequence of the comparatively small number of subscribers the price is higher than it would otherwise have been, and is nevertheless not likely to pay the expenses of publication, although a few extra copies have been printed in case the demand should increase after the nature of the index is more generally understood.

TRANSACTIONS

OF

THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *September 2nd*,

Present—Messrs. Ballard, Bell, Brew, Bucklee, Deane, and Morson. Not being a quorum, adjourned to

September 16th,

Present—Messrs. Bell, Davenport, Deane, George Edwards, Keeling, Meggeson, Moore, Morson, Peacock, and Squire. The following were elected

MEMBERS.

Baines, William Hobblesthwaite .....Brompton
Tuck, Francis .....Oxford

THE PRIZE ESSAY ON STARCH GRANULES, AND THE HERBARIA.

The adjudication of these prizes was referred to a Committee, consisting of Messrs. H. Deane, J. B. Edwards, Daniel Hanbury, T. N. R. Morson, and the President and Vice-President *ex officio*, assisted by Professors Redwood and Bentley.

ORIGINAL AND EXTRACTED ARTICLES.

REPORT OF THE RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION, AND OF THE APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

BY B. H. PAUL, Ph.D.

(*Continued from p.* 175.)

Preparation and Characters of Magnesium.—The physical and chemical characters of magnesium have been for the most part described by M. Bussy; and Prof. Wöhler expressed the opinion that this metal is volatile. MM. Deville and Caron* have ascertained this to be the fact by actual experiment. Magnesium volatilizes at nearly the same temperature as zinc, with which it has in other respects so much analogy. The melting-point also is nearly the same as that of zinc. The specific gravity is 1.75. The metal may be easily filed, and receives a good polish.

For the reduction of magnesium the chloride was employed; 600 grms. of the salt was well mixed with 100 grms. of chloride of sodium and potassium, previously melted and powdered, 100 grms. pure fluoride of calcium, and 100 grms. of sodium in small pieces. This mixture was transferred into a red-hot earthen crucible and the lid closed. After some time the reaction takes place, and when the hissing noise has ceased, the lid of the crucible is removed, and the mixture stirred with an iron rod until the whole appears uniformly mixed, and the upper portion of the liquid mass is clear. The crucible is then removed from the fire, and when the saline mass is nearly solidifying, it is to be stirred with an iron rod, so as to collect together the suspended particles of metal. The mass is then poured out upon an iron plate, broken into pieces, and the globules of magnesium picked out. The above charge yields 45 grms. magnesium.

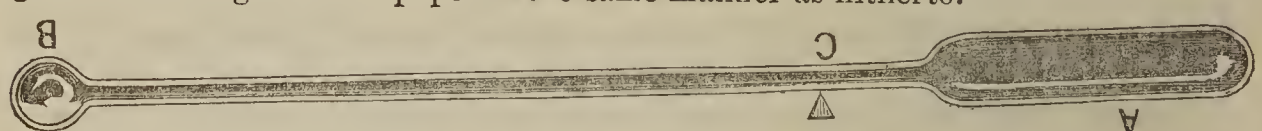
The crude metal thus obtained is placed in a carbon tray, within a tube of the same material and heated almost to whiteness, while a current of hydrogen gas is passed

* *Annalen der Chemie und Pharmacie*, ci., 359.

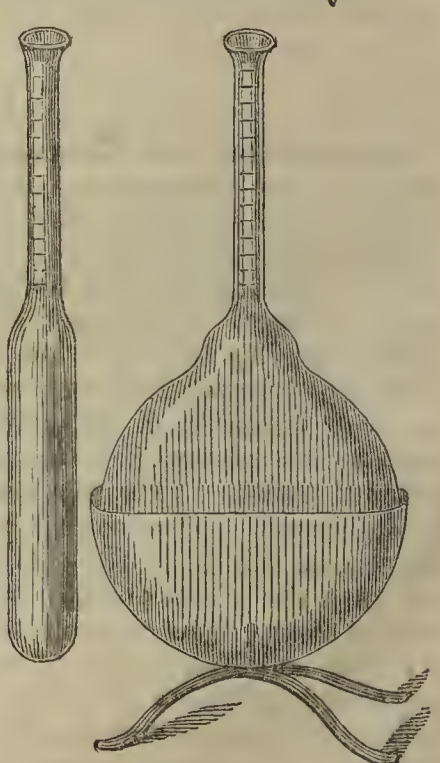
over it. When the tube is made to slant, so that the metal may condense beyond the carbon tray, it may be easily taken out. It is then to be remelted with a mixture of chloride of magnesium, chloride of sodium, and fluoride of calcium. By gradually increasing the amount of the latter salt, the saline mass is rendered less fusible than the magnesium, which may be run off at the moment the former solidifies. When the current of hydrogen employed in distilling the magnesium is rapid, some metallic dust is carried out of the apparatus suspended in the gas, which, when ignited, gives a very beautiful flame, and is a very brilliant lecture experiment.

Prof. Wöhler states that he has found this method very successful, but he recommends allowing the mass to cool in the crucible and breaking it afterwards, instead of pouring the melted mass out upon an iron plate.

Improved Thermograph.—Hr. Wollheim,* of Trieste, has constructed a thermograph, which consists essentially, like other instruments of this kind, of a balanced beam with a mercury vessel attached to it in such a way, that by the expansion or contraction of the mercury the centre of gravity is altered, and the beam takes a different position. At one end of the beam is fixed an index, which shows the temperature upon a scale. The novelty and peculiarity of Hr. Wollheim's instrument consists in the mercury vessel, which is a tube with two bulbs, one of which, *A*, is filled with mercury, while the smaller one, *B*, is only partially filled, leaving necessary space for the expansion of the mercury. The point of suspension of the beam is at *C*, and the equilibrium is so adjusted that, within the range of temperature which the instrument is intended to indicate, the small bulb may always be situated higher than the large one. The advantage of this construction consists in the intervals of the scale being much more equal than is the case with thermographs hitherto employed. Moreover, when two or three points in the scale are determined experimentally, the rest of the scale may be completed by a geometric construction devised by Hr. Wollheim, and as the divisions of the scale are tolerably uniform, it may be made much smaller than is the case with thermographs hitherto employed, without being less delicate. For registering the indications, a clockwork apparatus may be employed, which at intervals of five minutes presses the index of the beam against a moving sheet of paper in the same manner as hitherto.



Estimation of Specific Gravity.—Drs. Vogel and Reischauer† recommend the use of a flask with a flattened bulb for the purpose of estimating the specific gravity of liquids that are much affected by change of temperature. With such a flask the equalization of temperature is effected with much greater facility than in a flask of the ordinary form. This flask is filled and emptied by means of a pipette of equal capacity, with a long thin beak. The neck of the flask is graduated, each division representing a known fraction of the volume of the flask. By this means it is not requisite to remove any liquid from the flask by filter paper. In order to derive full advantage from the shape of the flask, it is necessary, on account of the uncertainty of reading off, that the neck of the flask should be very narrow, otherwise the advantage in observing the temperature is lost, especially in the case of liquids whose expansion is not widely different from that of water.



Method of Testing Guaiacum Wood for Admixtures of other Wood.—This method is based upon the character of guaiacum wood to assume a blue colour,

* *Polytechn. Journal*, cxliv., 176.
† *Gelehrte Anzeigen der R. Bäyer. Akad. der Wissens*, 1857, No. 54.

under the influence of certain substances. M. Huraut* uses for this purpose hypochlorite of soda or lime. 15 or 20 grms. of the wood is mixed with so much of the solution of one of the salts, that it is quite wetted. After a few seconds it presents a greenish colour, while the pieces of other wood remain unaltered. When the excess of liquid is strained off, and the shavings spread out upon paper, it is easy to detect admixtures of other wood, and to estimate approximatively the amount present. M. Huraut has found some samples containing more than half the weight of foreign substances.

Production of Phosphorus, Glue, and Chloride of Ammonium. — Hr. Gentele† suggests that the production of phosphorus, which has within the last few years become so much more important a branch of chemical industry, may be advantageously combined with the production of glue, sal ammoniac, and ferrocyanides.

The raw materials for the preparation of ferrocyanide are to be charred in the ordinary manner, and the liquid as well as solid carbonate of ammonia obtained at the same time is to be used for making sal ammoniac.

The separation of the fat from the bones is effected best by boiling them with water. The fat thus obtained serves for making soap. The bones are from time to time taken out of the water by means of rakes, and fresh bones put in until the liquid becomes gelatinous. This may, according to circumstances, be used as manure, or as food for pigs.

The phosphate of lime is then separated by digesting the bones in hydrochloric acid (1.03 to 1.05 sp. gr.) until they become soft and transparent. Fresh bones yield the largest amount of fat and also of gelatine ; in old bones the gelatine is for the most part decomposed. Even in fresh bones the amount of gelatine varies very much, some containing 45 per cent., and others only 30, or even less.

The bones from which phosphate of lime has been extracted by hydrochloric acid must be well washed with water, and lastly with lime water. The gelatinous residue is dried in the air, and then exposed to the action of steam in a well closed vat, furnished with one or more perforated false bottoms. After a short time, a stream of liquid gelatine flows out of the vat, sufficiently concentrated to be run into moulds and cut into sheets. When a more dilute solution begins to flow off, the remaining lumps of gelatine are taken from the vat and boiled with the thin solution, or with water, until completely dissolved, the liquid evaporated, and run into moulds.

For obtaining phosphate of lime and sal ammoniac two methods may be adopted:— The solution of phosphate of lime in hydrochloric acid may be precipitated by the crude solution of carbonate of ammonia obtained from the charring of the raw materials used for the production of ferrocyanide. When the precipitate has subsided, the solution of chloride of ammonium is drawn off, and a fresh quantity of the hydrochloric solution precipitated in the same vat. After repeating this operation several times, the precipitate is washed with water to remove the whole of the chloride of ammonium, and then mixed with some of the hydrochloric solution of phosphate of lime, so as to separate the carbonate of lime mixed with the phosphate. It is, however, preferable to precipitate the phosphate of lime by means of lime milk, because the hydrochloric solution of phosphate of lime is very dilute, and in the evaporation of the dilute solution of chloride of ammonium in iron pans the salt is rendered ferruginous, and the pans are eaten away. But when the solution of chloride of calcium obtained in precipitating the phosphate solution by lime milk is used for converting the carbonate of ammonia into chloride of ammonium, the solution may be evaporated in iron pans without detriment. The precipitation of the carbonate of lime should be effected with hot liquids, so as to ensure the complete precipitation of the lime. Effervescence takes place on mixing the liquids, because the carbonate of ammonia solution contains more carbonic acid than is equivalent to the calcium of the chloride of calcium. The phosphate of lime obtained by precipitating the hydrochloric solution with milk of lime contains animal substance. It is dried in porous vessels, and then gently ignited in a reverberatory furnace until it becomes white. In this state it is better adapted for the preparation of phosphorus than burnt bones, on account of its being more easily decomposed, and as it does not contain carbonate of lime there is a proportionate saving of sulphuric acid.

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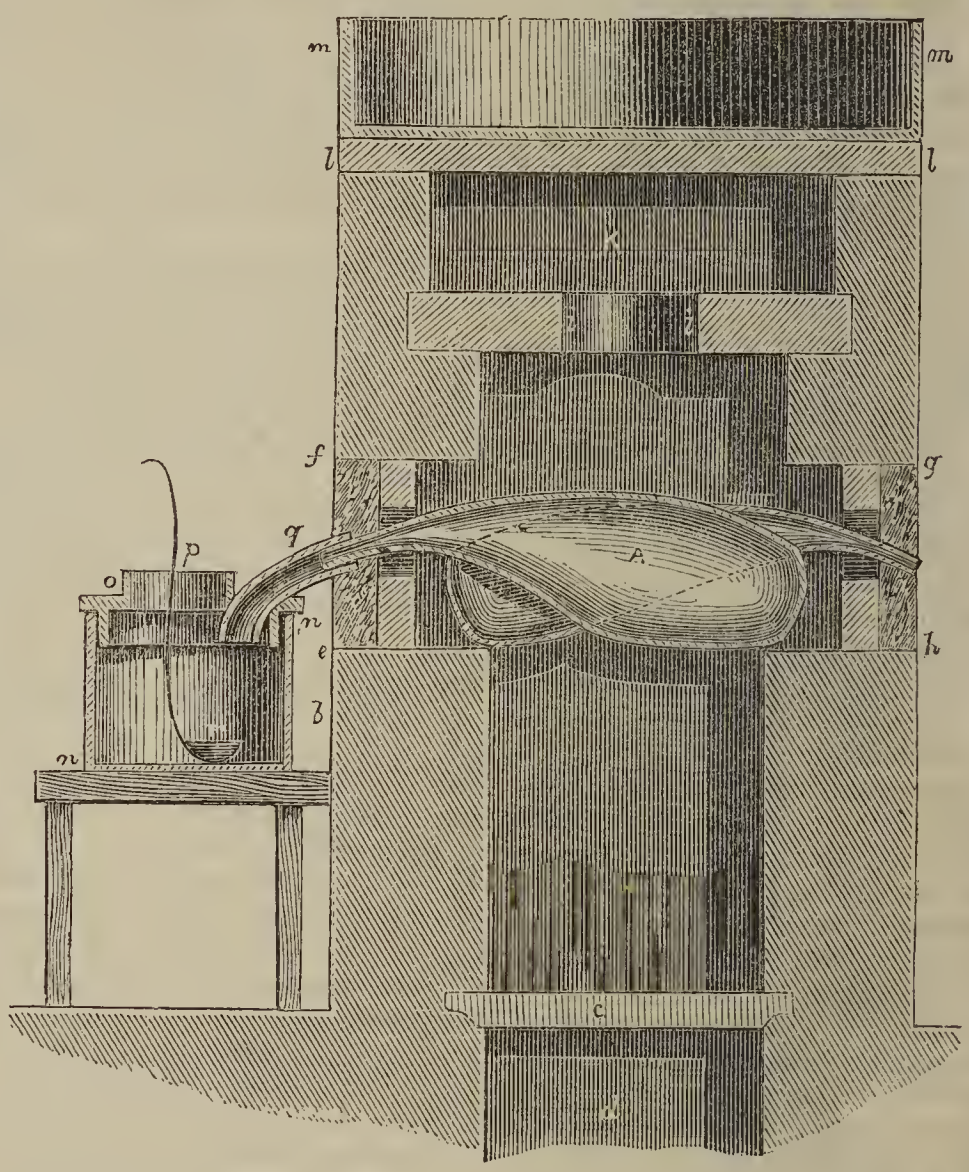
* *Journ. de Pharm. et de Chimie.*

† *Polytechn. Journal*, cxliv., 190.

The decomposition of the phosphate of lime by sulphuric acid is effected in the usual way. The separation of the phosphoric acid solution from the gypsum is effected in leaden vats with perforated bottoms, covered with layers of quartz fragments and sand. After the acid solution has filtered off, the residue of gypsum is washed by displacement with water. The phosphoric solution thus obtained is evaporated in leaden pans, heated by the flues leading from the distillation furnaces. The concentrated residue of the phosphoric solution, when mixed with charcoal, is dried in iron pans, covered with a stone vault, with openings in front, for charging the pans and stirring the contents, and with flues at the back, communicating with the chimney, for drawing off the vapours of sulphuric and sulphurous acids. The retorts used for distilling the phosphorus are similar to those used for distilling sulphuric acid from sulphate of iron. They are made of fire clay, about eighteen inches long, and four inches wide in the bulb. The furnace used for the distillation is likewise constructed in the same manner as the Saxon furnaces for distilling sulphuric acid. Each furnace holds twenty-four retorts, at distances of four or five inches apart. In the section *A A'* are the retorts; *b b*, the lateral walls of the fireplace; *c*, the grate fire bars; *d*, the ash pit; *f g h e* are openings through which the retorts are introduced. They are afterwards closed with loose stones, covered with mortar at the outside only, so that they may be removed without injury to the furnace.



A slab of sandstone, *i i*, covers the fireplace, and has square holes through which the flame passes to the iron plate *l l*, upon which the leaden evaporating pans rest. At the back of the furnace, the channel *K* is connected with the chimney, and the draught is regulated by a damper.

The receivers used are made of ordinary clay with lead glaze, and consist of two parts: a cylindrical vessel, *n n*, and a lid, *o o*, with an open neck, *p*, and a tube, *q*, four or five inches long, of such diameter as to receive the neck of the retort, and extending below the under surface of the lid, so as to dip into water contained in the cylindrical vessel. These receivers are cheaper than those made of copper, which are soon destroyed by the action of the hot phosphorus vapour, and the gases generated in the operation.

When the retorts have been arranged in the furnace, and the receivers charged with water connected, the fire is kindled, and very gradually increased during six or eight hours. During this time, water and sulphurous acid vapours are given off,

and when combustible gas begins to issue from the retorts, the connexion with the receiver is made tight with loam, leaving a very small hole for the escape of gases. An iron ladle, *r*, is then placed in each receiver, so as to catch the phosphorus condensing in the tube of the receiver, and the heat is raised sufficiently to carry on the distillation of the phosphorus. The progress of the distillation is best observed by raising the iron ladles from time to time, emptying their contents under the water in the receiver, and again replacing them, so as to catch the phosphorus as it comes over. During the whole operation combustible gas issues from the small hole in the luting, and burns with a blue flame. When this evolution of gas ceases, it may be owing to a stoppage in the neck of the retort, by the deposition of oxide of phosphorus. In this case the receiver must be removed, and a stout iron wire passed up the neck of the retort. When the neck of the retort is found to be clear, the stoppage of the gas must be owing to the retort being cracked.

After the heat has been maintained for forty-six hours, and finally raised to near whiteness, the quantity of phosphorus that passes over decreases so much, that it is not worth while to continue the operation. The receivers are then removed, and the phosphorus emptied into a vat under water. When the furnace has cooled, the retorts are taken out, and a fresh charge introduced. Each retort contains about seven or eight pounds of the dry mass, and yields eleven or twelve ounces of phosphorus. During the whole operation, the water in the receivers must be kept cold, without leaving the lower mouth of the tube *g* uncovered.

The improvements that still remain to be made in the preparation of phosphorus, relate only to the distillation. The cost of the material prepared for distillation does not amount to one-fourth the price of the phosphorus it yields, while the cost of the distillation amounts to one-half the price of the phosphorus. Hr. Gentele is therefore of opinion that there cannot be any advantage in attempting to prepare phosphorus with a mixture of charred bones ($2\ CaO,\ PO_5$), carbon, and silica, because a much higher temperature is requisite ; and to obtain a given quantity of phosphorus from this mixture, containing less than one-third as much phosphorus as that generally used, a very much larger consumption of fuel would be necessary.

The chief disadvantage of the present distillation method, consists in the circumstance that the furnace cannot be worked continuously, and therefore attempts should be made to effect the distillation in larger retorts, which, like those used for distilling zinc by the Altenburg method, may be emptied and charged without interfering with the fire. If this were effected, it is probable that there would be a saving of one-half the fuel at present used, and one cylinder would work as much of the mixture as a whole furnace does now ; and although this alone would very materially reduce the cost of production, yet it would be necessary to increase the size of all the other parts of the plant, and this could not be done at a factory without a certain prospect of there being a demand for the increased supply.

The crude phosphorus, obtained as above described, is purified by distillation from a large cast-iron retort, the neck of which only just dips into water, contained in a flat earthen pan, which is so full, that as phosphorus distils over, some of the water runs over the edge.

The phosphorus to be distilled is cut in pieces under water, mixed with some wet sand, and put into the retort in quantities of ten or twelve pounds. The wet sand serves to prevent the ignition of the phosphorus while charging the retort. The application of heat to the retort requires great caution. In the first instance the water adhering to the phosphorus evaporates, and drives out a portion of the air, then bubbles of gas issue, which sometimes ignites when escaping from the water, and, lastly, drops of phosphorus pass over, and condense in the neck of the retort. From this time the heat must be kept up uniformly, until no more phosphorus comes over ; since if the heat is allowed to decrease, air or water may get into the retort, and give rise to explosions. During the distillation, the water in the receiver is kept cold, and the phosphorus is removed from time to time by an iron ladle ; so that in the event of an explosion, phosphorus may not be ignited and thrown about.

For obtaining the phosphorus in the shape of sticks, the ordinary vessel is used for melting the phosphorus ; but in the cock is cemented a glass tube, several feet long, and of uniform bore. This is closed at the lower end with a cork, to which a wire is attached, and the glass tube is surrounded by a vessel containing cold water. The cock of the vessel containing the melted phosphorus is then opened, so as to admit the phosphorus into the glass tube, and when it has solidified, the cork is carefully

withdrawn, and with it the rod of phosphorus, while fresh liquid phosphorus passes into the tube. By a little management the whole of the phosphorus may thus be drawn out in one stick, and coiled round in the tub, or cut with scissors under water. If the stick should happen to be drawn out too quick, before the phosphorus in the tube is solidified, the cock must be shut, the phosphorus that escapes put back into the melting vessel, and the operation recommenced as in the first instance.

Grinding of Pigments.—Prof. Vogel* recommends the use of alcohol as a medium for grinding colours which are to be mixed with varnish. The advantage of this plan is twofold. Owing to the inferior density of alcohol a finely-divided powder is more quickly obtained than when water is used. Further, the necessity for the troublesome operation of drying the ground pigment before mixing it with varnish or turpentine is done away with. He states also that, for chemical purposes, alcohol may often be used with advantage in grinding substances, such as minerals.

Production of Nitrous Acid from Ammonia.—At the ordinary temperature oxygen does not affect ammonia, either in the gaseous or liquid state; but ozonized oxygen converts both the hydrogen into water and the nitrogen into nitric acid. Prof. Schönbein† finds also that in the presence of platinum or copper, ammonia is oxidized by ordinary oxygen and nitrite of ammonia produced.

When platinum black moistened with solution of ammonia is left for some time in contact with oxygen or atmospheric air, and the metallic powder then extracted with water, nitrite of ammonia is found in solution. On the addition of sulphuric acid to this solution, starch paste containing iodide of potassium is immediately turned blue. Compact platinum does not determine the oxidation of ammonia at the ordinary temperature, but does by the aid of heat. When a heated spiral of platinum wire is introduced into a flask moistened with solution of ammonia, a strip of paper saturated with acidified starch paste and iodide of potassium immediately becomes blue. The temperature at which this effect is produced by platinum wire is below a red heat. Iron and copper wire produce the same effect, but they require to be bright red hot.

Finely divided copper also determines the oxidation of ammonia even better than platinum at the ordinary temperature. When finely divided copper, obtained by reducing oxide of copper with hydrogen, is moistened with ammonia solution in a flask containing oxygen or atmospheric air, the metallic powder soon becomes hot, and the flask filled with white vapour of nitrite of ammonia. In this way, by using a considerable quantity of copper, the whole of the oxygen may be abstracted from a cubic foot of air in a few minutes.

The blue liquid obtained by shaking powdered copper with ammonia solution and atmospheric air contains, besides oxide of copper nitrite of ammonia. When boiled with soda solution, to separate the ammonia and precipitate oxide of copper, a solution is obtained, which, when evaporated to dryness, leaves a yellowish salt, consisting chiefly of nitrite of soda. This residue, when heated with charcoal powder, deflagrates; with sulphuric acid it gives dense fumes of nitrous acid; it bleaches a very acid solution of sulphate of indigo; and colours a solution of protosulphate of iron, containing free sulphuric acid, brown.

The rapid absorption of oxygen from atmospheric air by means of ammonia solution and finely divided copper may perhaps be useful in some instances for the preparation of nitrogen.

In 1852, M. Barruel‡ found that the copper may be extracted from copper pyrites or grey copper ores by suspending the powdered ore for a few hours in solution of ammonia and passing a current of atmospheric air through the liquid, and it is probable that in this case the reaction may be similar to that above described.

Mr. Tuttle§ has also ascertained the presence of nitrous acid in the blue solution produced when a mixture of metallic copper and ammonia solution is left in contact with atmospheric air. In order to ascertain whether the oxidation of the ammonia was simultaneous with or subsequent to the oxidation of the copper, he tested an ammoniacal solution of oxide of copper for nitrous acid after it had been exposed for

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* *Neues Repertorium für Pharmacie*, vi., 3.
† Poggendorff's *Annalen*, c., 292.
‡ *Polytechn. Journ.*, cxxv., 115, and cxxxvi., 152.
§ *Annalen der Chemie und Pharmacie*, ci., 283.

some weeks to the atmosphere. The result was negative, not a trace of nitrous acid could be recognized. When, however, a colourless solution of suboxide of copper was exposed to the air, traces of nitrous acid were produced as the liquid became blue, owing to the conversion of suboxide of copper into protoxide. It is therefore evident that the oxidation of the ammonia takes place simultaneously with that of the copper.

Method of Cleaning Soiled Silver Vessels, &c.—Prof. Böttger* states that silver utensils, which are stained by sulphuretted hydrogen, &c., may be easily cleaned, by immersing them in a boiling saturated solution of borax, or a moderately concentrated solution of caustic potash in contact with metallic zinc. A zinc sieve may be used.

Preparation of a fine Carmine-coloured Sulphide of Antimony.—Prof. Böttger† gives the following method of preparing this pigment :—Chloride of antimony (sp. gr. 1.35) is mixed, in a porcelain basin, with a solution consisting of 1.5 its weight of hyposulphite of soda and three times its weight of water; the mixture gradually heated and stirred meanwhile until no further precipitate separates. The sulphide of antimony thus obtained has a remarkably fine carmine colour. Care must be taken, however, that, before washing it, the adherent mother liquid may separate as much as possible. It is then to be washed with very dilute acetic acid for some time, and lastly with water. If water were used in the first instance the colour would be injured by the admixture of algaroth powder, in consequence of the decomposition of chloride of antimony still adhering to the precipitate.

When this precipitate is boiled with a solution of carbonate of soda, it is converted into kermes. By the action of acetic, oxalic, phosphoric, formic, boracic, citric, or tartaric acids, and even of dilute sulphuric acid, or hyposulphite of soda, it is not sensibly acted upon, either at the ordinary temperature or when heated—indeed, the intensity of the colour appears to be increased; on the contrary, it is readily decomposed by hydrochloric acid or nitric acid (sp. gr. 1.2), and also by chromic acid with the aid of heat. Caustic ammonia dissolves it partially; caustic soda or potash completely, producing a solution which may be advantageously used for bronzing copper.

Chemical Nature of Positive Photographs, and the Cause of their Alteration.—The change which positive photographs gradually experience under the influence of light and air has not hitherto been satisfactorily explained, although several chemists have directed their attention to the subject. Dr. Weiler‡ is disposed to ascribe it to the action of nitrous or nitric acid originating from the spontaneous decomposition of a substance analogous to xyloidin, which is produced in the mass of the paper during the preparation of the picture, by the action of nitric acid liberated in the decomposition of nitrate of silver, upon the substance of the paper. The spontaneous decomposition of xyloidin has been noticed by several chemists, and adds some degree of probability to Dr. Weiler's opinion. In the case of paper charged with nitrate of silver alone, and exposed to the influence of light, the blackening is due to a decomposition of the salt, probably reduction of the metal, and at the same time nitric acid would be liberated in a condition most favourable for entering into combination with the paper. In the case of paper charged with chloride of silver, the action of light would cause a liberation of chlorine, and this reacting upon the nitrate of silver remaining in the paper, would liberate nitric acid. When animal substances are used in the preparation of the paper, the liberated nitric acid would most likely give rise to the production of substances analogous to xanthogenic acid. The yellowish-brown colour of photographs prepared with albumenized paper is probably due to the presence of such a substance.

Preservation of Wood, &c., by Means of Coal Tar Oil,—Creosote.—Dr. Vohl§ recommends mixing the creosote with caustic soda until it becomes miscible with water in any proportion, and applying this liquid to the wood. It is very rapidly absorbed, and when the wood is saturated the creosote is fixed by immersing the wood in a dilute solution of sulphate of iron. The sulphuric acid combines with the

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* *Jahresbericht des Physikalischen Vereins zu Frankfort a. M.*
† *Polytechn. Notizblatt*, 1857, No. 8.
‡ Horn's *Photographic Journal*, 1857, No. 11.
§ *Polytechn. Journal*, cxliv. 448.

soda, the creosote with the woody fibre, and the protoxide of iron that is precipitated is subsequently converted into peroxide by the atmospheric oxygen absorbed by the wood, while the sulphate of soda washes out when the wood is buried in the ground. Wood prepared in this way has stood for eight years, exposed to varying influences of climate, without showing any indications of decay. Dr. Vohl states that the coal tar oil, commonly called creosote, consists for the most part of ethereal oils, and contains only a small per-centage of creosote or of carbolic acid. He recommends for the examination of this oil, mixing a known volume with 10 per cent. of strong caustic alkaline solution in a graduated tube, and shaking the mixture well After a time it separates into three layers, the lower one being pure caustic alkali, the middle one contains the creosote and carbolic acid, and the upper layer consists of the ethereal oils. As the real value of the oil used for impregnating wood depends upon the amount of creosote and carbolic acid it contains, this method may serve for its valuation. In this way Dr. Vohl has found that coal tar oil obtained from England, France, and Belgium, does not contain at the most more than 8 or 10 per cent. of creosote and carbolic acid, while the oil obtained in the production of photogen contains at least 70 per cent. of these substances.

The impregnation of ships' cordage and sail-cloth with creosote is effected by means of the combination of creosote with gelatinous substances, such as skin, leather, &c. For this purpose the cloth or rope is immersed in a dilute solution of gelatine, and then passed through a bath of oak-bark decoction, after which it is impregnated with creosote. Sail-cloth treated in this way has been in ordinary use for six years without showing any signs of decay.

Preparation of Phosphuretted Hydrogen.—Although phosphorus is classed among electro negative substances, and is a perfect non-conductor of electricity, it nevertheless presents, in relation to solutions of certain metallic salts, such a remarkable power of reduction, that it might almost be regarded as a conductor of electricity possessing characters which, with this exception, are observed only in decidedly electro positive metals, such as zinc and iron. Thus, for instance, a piece of phosphorus immersed in solution of bichloride of gold becomes covered within a short time with a bright coating of metallic gold several lines thick. Copper salts, in like manner, are reduced by phosphorus, and the metal separated a coherent mass. Prof. Böttger* has extended these observations of the behaviour of phosphorus to solutions of metallic salts with the aid of heat, and has discovered a very interesting mode of production of spontaneously inflammable phosphuretted hydrogen. When phosphorus, that has been freed from the white outer crust by digestion with a solution of bichromate of potash acidified with sulphuric acid, is covered with a concentrated solution of sulphate of copper, in a porcelain basin, and the liquid heated to near the boiling point, metallic copper is at first precipitated, and after a time the colour of the mixture of phosphorus and copper changes, while the liquid becomes perfectly clear and colourless. When fresh solution of sulphate of copper is added, and the temperature kept up, the mixture of copper and phosphorus being meanwhile frequently broken up with a pestle, its colour gradually becomes darker, and at last a point is reached at which all the phosphorus appears converted into a dirty greyish-black powder. When this powder is washed upon a filter, it continues to retain an acid reaction however long the washing may be continued. Pressed between folds of absorbent paper, so as to separate rapidly the adherent moisture, and then exposed to the direct rays of the sun, or to a temperature of 86° to 97° F., it gradually assumes an olive-green colour, and within a few minutes ignites spontaneously. This dirty greyish-black substance is a mixture of phosphide of copper and basic phosphate of copper; in a moist state it has a faint earthy smell. When boiled for a considerable time with a solution of bichromate of potash acidulated with sulphuric acid, the liquid gradually becomes intensely green, while pure grey-black phosphide of copper remains undissolved. The pure phosphide of copper may be washed without becoming acid. The colourless acid liquid remaining after treating sulphate of copper solution with phosphorus, consists merely of sulphuric acid, phosphorous acid, and some phosphoric acid.

Neutral acetate of copper presents the same reaction when boiled with phosphorus, except that in this case some insoluble phosphate of copper is separated at the first, but as acetic acid is also set free, this is redissolved, and at last the dirty grey-black residue is obtained as from sulphate of copper.

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* *Polytechn. Notizblatt*, 1857, No. 8.

When the phosphide of copper is boiled for some time with hydrochloric acid, a small portion is dissolved, ordinary phosphuretted hydrogen is generated, and subchloride of copper produced. When the phosphide is mixed with water and iodine, great heat is evolved, subiodide of copper is produced, and the filtered liquid contains hydriodic acid and phosphoric acid. A mixture of the phosphide with chlorate of potash does not explode when struck with a hammer, but merely ignites without report. Professor Böttger found the composition of this phosphide of copper corresponds to the formula of 3 Cu O:—

		Calculated.	
3 Cu.	96	74.67	75.35
P.	31.5	25.33	24.65
	127.5	100.00	100.00

When this phosphide, or the above-mentioned mixture with phosphate of copper is covered with finely powdered cyanide of potassium, and slightly moistened with water, it is immediately decomposed even at the ordinary temperature, with evolution of phosphuretted hydrogen, which is spontaneously combustible. The other products of the decomposition are cuprocyanide of potassium and cyanate of potash. When the mixture of phosphide and cyanide is moistened with spirit containing eighty per cent. of alcohol, the phosphuretted hydrogen generated is not spontaneously inflammable. When amorphous phosphorus is boiled with sulphate of copper solution, the production of phosphide of copper takes place only at the surface of the particles, which become covered with a very thin film of the phosphide, and here the reaction ceases. Dr. Böttger thinks that the production of phosphide here may be owing to the admixture of ordinary phosphorus with the amorphous substance, and suggests that the treatment of amorphous phosphorus with a boiling solution of sulphate of copper would prove a means of separating this admixture, and rendering amorphous phosphorus a perfectly harmless substance.

Sulphate of nickel solution boiled with phosphorus does not give rise to any phosphide of nickel. The phosphorus acquires a grey colour, owing to the reduction of nickel upon its surface. With sulphate of cobalt, manganese, proto or persulphate of iron, no change is produced. Phosphorus boiled in a solution of acetate of lead, acquires a superficial grey colour, but phosphide of lead is not produced. A solution of nitrate of silver gives phosphide of silver in the same way as sulphate of copper. This phosphide does not generate phosphuretted hydrogen with cyanide of potassium. Solutions of chromium, antimony, zinc, or cadmium compounds are not decomposed by boiling with phosphorus.

As phosphide of silver is an excellent conductor of electricity, perhaps it may be serviceable in galvanoplastic operations for coating small and delicate objects that do not conduct, such as flowers, leaves, insects, &c. For this purpose it is only necessary to moisten the surface with nitrate of silver solution, and then to expose the object to the action of non-inflammable phosphuretted hydrogen, generated by the action of cyanide of potassium upon phosphide of copper in the presence of alcohol.

Metallic Phosphides.—Hr. Hvoslef* has examined some metallic phosphides, viz.:—

The phosphide of iron, P Fe_2, was obtained by the action of phosphorus vapour upon finely-divided iron at a dull red heat. This substance is grey, not magnetic; it burns when heated, and is not acted upon by hydrochloric or nitric acid.

Fe_6 P was obtained by melting the above substance under a layer of borax. It has a dark iron colour, is very brittle, has a granular fracture, and is magnetic. The density is 6.28.

Cu_4 P was obtained by the action of phosphorus vapour on ignited copper. The combination was attended with incandescence. It is dull grey, and consists of adherent particles.

Cu_6 P was obtained by melting the above substance under a layer of borax. It has an uneven fracture, is very brittle, and its density is 6.59.

Zn P was obtained by melting vitreous pyrophosphate of soda and zinc filings in a coated retort, boiling the black mass with hydrochloric acid, which dissolves zinc, phosphate of zinc, and soda. The phosphide remains as grey metallic laminæ, which

* *Annalen der Chemie und Pharmacie*, c., 99.

give a powder of a reddish tinge. It burns in the air with flame, and when heated gives off phosphorus.

In the interior of the retort was a sublimate of reddish needles, which burnt in the air with a white flame. When heated without access of air, they became black, and turned red again when cold. When strongly heated, they gave off phosphorus. They were not acted upon by acids.

Zn_3 P was obtained by heating a mixture of phosphoric acid with seven equivalents of carbon, and two equivalents of oxide of zinc in an earthen retort. Spontaneously inflammable phosphuretted hydrogen was evolved, and in the neck of the retort was found a compact sublimate, crystallized in plates. It has a dark steel grey colour, is brittle, and is dissolved by hydrochloric acid, with evolution of phosphuretted hydrogen. Several phosphides of zinc were obtained by igniting oxide of zinc in phosphorus vapour.

Phosphide of copper and zinc was obtained by melting brass with anhydrous phosphoric acid and charcoal powder, under a layer of borax. It is a blueish-white substance, with laminar fracture, and consists of 77.54 per cent. copper, 7.58 zinc, and 14.84 phosphorus, which is nearly represented by the formula 10 (Cu_6 P) + Zn_6 P.

Influence of Cane Sugar upon Digestion and Nutrition.—The following results have been obtained by Dr. Hoppe* in his experiments with dogs:—

1. Cane-sugar is not affected by saliva or by gastric juice, within from one to two hours.
2. Large doses of cane-sugar produced vomiting in dogs after one or two hours.
3. When the gastric juice was neutralized with chalk, the same results were obtained.
4. Yeast produced no change upon sugar in the stomach when the gastric juice was neutralized with chalk.
5. When sugar was given continuously, it was not found in the excrements.
6. The amount of lactic acid in the urine was increased by administration of sugar.
7. When sugar was given together with flesh, the weight of the body increased much more rapidly than when flesh was given alone.
8. Under the former conditions much less urea was excreted than in the latter.
9. When sugar alone was given as food the excretion of urea was reduced to a minimum.
10. The excretion of nitrogen in the fœces was the same whether flesh was given alone or together with sugar.
11. When there is much sugar in the blood, albumen and its analogs are protected from oxidation. The albumen in this case seems to be decomposed with production of fat. In this way sugar fattens indirectly only when there is a full supply of albuminous substances.
12. The assumption of Bernard that sugar gives rise to the production of saccharine substances in the liver, while the sugar taken as food is converted into fat, Dr. Hoppe considers untenable; as well as the opinion that the production of sugar in the liver is chief source of animal heat.
13. The temperature of the body is the same when flesh is given alone or together with sugar.
14. Feeding for eight days with large quantities of cane-sugar and abundance of flesh did not produce disturbance in the ordinary state of the dog.
15. The examination of the dog's urine, during and after the experiments, did not show the presence of a trace of uric acid. Cyanuric acid was found only in very inconsiderable amount in about twenty-five litres of urine.

New Alkaloid from Conium Maculatum.—Prof. Wertheim† has obtained a new alkaloid, to which he gives the name of conydrine, in the form of colourless nacreous irridescent crystalline laminæ. It is fusible at a moderate heat, and may be gradually sublimed at 212° F. At a higher temperature it volatilizes rapidly, giving off the peculiar odour of coniine. It is soluble in water; very soluble in alcohol and ether. The solutions have a strong alkaline reaction. At the ordinary temperature this base displaces ammonia from its compounds, and appears to be displaced by coniine. The solution neutralized with hydrochloric acid could not be

* Virchow's *Archiv. für Pathalog. Anatomie u. Physiologie*, x. 144.
† *Ann. der Chem. u. Pharm.*, c., 328.

crystallized, but when mixed, an alcoholic solution of bichloride of platinum, and evaporated over sulphuric acid, large hyacinth red crystals are obtained. Analysis gave on the average:

	C.	H.	N.	O.	Pt.	
Found.....	27.54	5.31	4.55	—	28.03	$= C_{16} H_{17} NO_2, Cl H, Pt Cl_2$
Calculated...	27.47	5.15	4.01	4.57	28.33	

Thus, the composition of this alkaloid differs from that of coniine ($C_{16} H_{15} N$) by 2 HO.

By distillation with anhydrous phosphoric acid, it is converted into coniine. The poisonous effects of conydrine are the same as those of coniine, but much weaker.

This substance was obtained by extracting the fresh flowers of *C. maculatum* with water containing sulphuric acid, and distilling the neutralized liquid rapidly. The alkaline distillate contained ammonia, coniine, and the new base; it was neutralized with sulphuric acid, evaporated to a syrup, the residue exhausted with absolute alcohol, the solution evaporated, the residue mixed with excess of caustic alkali, and kept cold meanwhile. This mixture was digested for some time with ether. The ethereal solution was distilled below 212° F., and when the ether was separated, the temperature was raised. Coniine distilled over first, and afterwards the neck of the retort was filled with colourless crystalline laminæ of the new base. It appears to distil at from 302° to 410° F. The adherent coniine was separated by pressing the crystals between absorbent paper and recrystallizing from ether.

Hydrochlorate of Coniine.—Prof. Wertheim* states, in opposition to the general account of this salt, that it is crystalline, and not in the least deliquescent; that the crystals are rhombic, have the formula $C_{16} H_{15} N, HCl$; and easily obtained even with very small quantities of coniine upon a watch glass.

Crystallized Sulphocyanide of Silver is obtained in the form of nacreous laminæ, according to Hr. Gössmann,† by adding ammonia to a solution of the double sulphocyanide of silver and ammonium.

Production of Sulphuric Acid from Gypsum.—Hr. Köhsel‡ has obtained a patent in Hanover for making sulphuric acid. His method consists in igniting powdered gypsum and charcoal in cylinders, so as to obtain sulphide of calcium and carbonic acid. The sulphide of calcium, mixed with water, is then subjected to the action of carbonic acid, in a series of air-tight vessels, heated by the waste heat of the furnace, so as to produce sulphuretted hydrogen and carbonate of lime. The sulphuretted hydrogen is burnt, and the resulting mixture of sulphurous acid and water vapour treated in the usual manner in the lead chamber. In this method the carbonic acid produced by the reaction of the gypsum with charcoal is employed for decomposing the sulphide of lime obtained in a previous operation.

Synthesis of the Hydrocarbons.—M. Berthelot§ finds that when a mixture of bisulphide of carbon and sulphuretted or phosphuretted hydrogen is exposed to the action of copper at a dull red heat, there are produced hydrogen, marsh gas ($C_2 H_4$), a sensible amount of olefiant gas ($C_4 H_4$), and a trace of naphthalin ($C_{20} H_8$). The amount of olefiant gas is greater when a mixture of bisulphide of carbon, sulphuretted hydrogen, and carbonic oxide, is exposed to the action of iron. In this case the carbon of the olefiant gas produced may equal $\frac{1}{16}$ of the carbon of bisulphide decomposed. The marsh gas produced in this way was separated by solvents. The olefiant gas was combined with bromine, then converted into crystallized sulphovinate of baryta, and into benzoic ether.

By the dry distillation of formiate of baryta there are produced marsh gas ($C_2 H_4$), olefiant gas ($C_4 H_4$), and propylen ($C_6 H_6$). Hence it follows that both these carbides and the corresponding alcohols may be obtained by pure synthesis; for M. Berthelot has already shown‖ that the formiates may be produced from carbonic oxide, and that the above carbides may be converted into their corresponding alcohols by means of sulphuric acid or hydracids.¶

When carbonic oxide and marsh gas are passed through a dull red hot tube, a

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* *Ann. der Chem. u. Pharm.*, c., 335. † *Ibid.*, c., 76.
‡ *Mittheilungen des Hannoverschen Gewerbevereins*, 1856, p. 135.
§ *Comptes Rendus*, xliii., 236.
‖ *Journ. für Prakt. Chem.* lxviii., 146. ¶ *Ibid.*, lxv. 274.

small proportion of propylen is produced. Marsh gas alone does not give the same result.

By the dry distillation of acetate of soda there are produced a small amount of olefiant gas, propylen ($C_6 H_6$), butylen ($C_8 H_8$), and some amylen ($C_{10} H_{10}$); the carbon in these carbides may amount to $\frac{1}{20}$ of that in the acetate decomposed. Thus the acetates may be produced from the alcohol formed from olefiant gas.

These carbides were combined with bromine, and separately examined. They were separated from bromine by heating the bromine compound with copper, water, and iodide of potassium, in a tube free from air, to 482° F. In the absence of copper the hydrides of these substances are obtained. Thus the bromide of olefiant gas ($C_4 H_4 Br_2$) gives ($C_4 H_6$); that of propylen gives ($C_6 H_8$).

Action of Nascent Hydrogen upon Bisulphide of Carbon.—M. Garard* finds that when bisulphide of carbon is brought in contact with hydrogen generated by sulphuric acid and zinc, at the moment of liberation one-half of the sulphur is replaced by hydrogen and a compound produced, the composition of which is represented by the empirical formula—C H S.

	C	H	S
Analysis	25.8	4.4	69.9
Calculation	25.8	4.3	69.9

This substance is colourless and crystalline; sublimes at 302° F. in long needles; above 392° F. it is decomposed. It is insoluble in water; sparingly soluble in alcohol, ether, and naphtha; more soluble in chloroform and bisulphide of carbon; most soluble in benzol. From these solutions it crystallizes in four-sided prisms. It has no action upon vegetable colours; alkalies do not affect it. It is dissolved by hydrochloric acid, and again separated on cooling. It appears to combine with some salts; with nitrate of silver, it forms fine, colourless, hexagonal crystals. The alcoholic solution gives a yellow precipitate with bichloride of platinum, or of gold, and with bichloride of mercury.

ON THE SOUNDS PRODUCED BY THE COMBUSTION OF GASES IN TUBES.

BY JOHN TYNDALL, F.R.S.

In the first volume of *Nicholson's Journal*, published in 1802, the sounds produced by the combustion of hydrogen in tubes are referred to as having been "made in Italy:" Dr. Higgins, in the same place, shows that he had discovered them in the year 1777, while observing the water formed in a glass vessel by the slow combustion of a slender stream of hydrogen. Chladni, in his *Akustik*, published in 1802, page 74, speaks of their being mentioned, and incorrectly explained, by De Luc in his *New Ideas on Meteorology:* I do not know the date of the volume. Chladni himself showed that the tones produced were the same as those of an open pipe of the same length as the tube which encompassed the flame. He also succeeded in obtaining a tone and its octave from the same tube, and in one case obtained the fifth of the octave. In a paper published in the *Journal de Physique* in 1802, G. De la Rive endeavoured to account for the sounds by referring them to the alternate contraction and expansion of aqueous vapour; basing his opinion upon a series of experiments of great beauty and ingenuity made with the bulbs of thermometers. In 1818, Mr. Faraday took up the subject,† and showed that the tones were produced when the glass tube was enveloped by an atmosphere higher in temperature than 212° Fahr. That they were not due to aqueous vapour was further shown by the fact that they could be produced by the combustion of carbonic oxide. He referred the sounds to successive explosions produced by the periodic combination of the atmospheric oxygen with the issuing jet of hydrogen gas. This is undoubtedly the true source of the sounds.

I am not aware that the dependence of the pitch of the note on the size of the flame has as yet been noticed. To this point I will, in the first place, briefly direct attention.

A tube 25 inches long was placed over an ignited jet of hydrogen: the sound produced was the fundamental note of the tube.

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* *Comptes Rendus*, xliii., 396.

† *Journal of Science and the Arts*, vol. v., p. 274.

A tube 12½ inches long was brought over the same flame, but no sound was obtained.

The flame was lowered, so as to make it as small as possible, and the tube last mentioned was again brought over it; it gave a clear melodious note, which was the octave of that obtained with the 25-inch tube.

The 25-inch tube was now brought over the same flame; it no longer gave its fundamental note, but exactly the same note as that obtained from the tube of half its length.

Thus we see, that although the speed with which the explosions succeed each other depends upon the length of the tube, the flame has also a voice in the matter: that to produce a musical sound, its size must be such as to enable it to explode in unison either with the fundamental pulses of the tube, or with the pulses of its harmonic divisions.

With a tube 6 feet 9 inches long, by varying the size of the flame, and adjusting the depth to which it reached within the tube, I have obtained a series of notes in the ratio of the numbers 1, 2, 3, 4, 5.

These experiments explain the capricious nature of the sounds sometimes obtained by lecturers upon this subject. It is, however, always possible to render the sounds clear and sweet, by suitably adjusting the size of the flame to the length of the tube.*

Since the experiments of Mr. Faraday, nothing, that I am aware of, has been added to this subject until quite recently. In a recent number of Poggendorff's *Annalen*, an interesting experiment is described by M. Schaffgotsch, and made the subject of some remarks by Prof. Poggendorff himself. A musical note was obtained with a jet of ordinary coal-gas, and it was found that when the voice was pitched to the same note the flame assumed a lively motion, which could be augmented until the flame was actually extinguished. M. Schaffgotsch does not describe the conditions necessary to the success of his experiment; and it was while endeavouring to find out these conditions that I alighted upon the facts which form the principal subject of this brief notice. I may remark that M. Schaffgotsch's result may be produced, with certainty, if the gas be caused to issue under sufficient pressure through a very small orifice.

In the first experiments I made use of a tapering brass jet 10½ inches long, and having a superior orifice about $\frac{1}{20}$th of an inch in diameter. The shaking of the singing flame within the glass tube, when the voice was properly pitched, was so manifest as to be seen by several hundred people at once.

I placed a syrene within a few feet of the singing-flame, and gradually heightened the note produced by the instrument. As the sounds of the flame and syrene approached perfect unison, the flame shook, jumping up and down within the tube. The interval between the jumps became greater until the unison was perfect, when the motion ceased for an instant ; the syrene still increasing in pitch, the motion of the flame again appeared, the jumpings became quicker and quicker, until finally it escaped cognizance by the eye.

This experiment showed that the jumping of the flame, observed by M. Schaffgotsch, is the optical expression of the *beats* which occur at each side of the perfect unison. The beats could be heard in exact accordance with the shortening and lengthening of the flame. Beyond the region of these beats, in both directions, the sound of the syrene produced no visible motion of the flame. What is true of the syrene is true of the voice.

While repeating and varying these experiments, I once had a silent flame within a tube, and on pitching my voice to the note of the tube, the flame, to my great surprise, instantly started into song. Placing the finger on the end of the tube, and silencing the melody, on repeating the experiment the same result was obtained.

I placed the syrene near the flame, as before. The latter was burning tranquilly within its tube. Ascending gradually from the lowest notes of the instrument, at the moment when the sound of the syrene reached the pitch of the tube which surrounded the gas flame, the latter suddenly stretched itself and commenced its song, which continued indefinitely after the syrene had ceased to sound.

With the jet which I have described, and a glass tube twelve inches long, and

* With a tube 14½ inches in length and an exceedingly minute jet of gas, I obtained, without altering the quantity of gas, a note and its octave: the flame possessed the power of changing its own dimensions to suit both notes.

from a half to three-quarters of an inch internal diameter, this result can be obtained with ease and certainty. If the voice be thrown a little higher or lower than the note due to the tube, no visible effect is produced upon the flame : the pitch of the voice must lie within the region of the audible beats.

By varying the length of the tube, we vary the note produced, and the voice must be modified accordingly.

That the shaking of the flame, to which I have already referred, proceeds in exact accordance with the beats, is beautifully shown by a tuning-fork which gives the same note as the flame. Loading the fork, so as to throw it slightly out of unison with the flame, when the former is sounded and brought near the flame, the jumpings are seen at exactly the same intervals as those in which the beats are heard. When the tuning-fork is brought over a resonant jar or bottle, the beats may be heard and the jumpings seen by a thousand people at once. By changing the load upon the tuning-fork, or by slightly altering the size of the flame, the quickness with which the beats succeed each other may be changed, but in all cases the jumpings address the eye at the same moment that the beats address the ear.

With the tuning-fork I have obtained the same results as with the voice and syrene. Holding a fork over a tube which responds to it, and which contains within it a silent flame of gas, the latter immediately starts into song. I have obtained this result with a series of tubes varying from $10\frac{1}{2}$ to 29 inches in length. The following experiment could be made:—a series of tubes capable of producing the notes of the gamut, might be placed over suitable jets of gas. All being silent, let the gamut be run over by a musician with an instrument sufficiently powerful, placed at a distance of twenty or thirty yards. At the sound of each particular note, the gas-jet contained in the corresponding tube would instantly start into song.

I must remark, however, that with the jet which I have used, the experiment is most easily made with a tube about eleven or twelve inches long. With longer tubes it is more difficult to prevent the flame from singing spontaneously, that is, without external excitation.

The principal point to be attended to is this. With a tube, say of twelve inches in length, the flame requires to occupy a certain position in the tube, in order that it shall sing with a maximum intensity. Let the tube be raised, so that the flame may penetrate it to a less extent. The energy of the sound will be thereby diminished, and a point (A) will at length be attained where it will cease altogether. Above this point, for a certain distance, the flame may be caused to burn tranquilly and silently for any length of time, but when excited by the voice it will sing.

When the flame is too near the point (A), on being excited by the voice or by a tuning-fork, it will respond for a short time, and then cease. A little above the point where this cessation occurs, the flame burns tranquilly, if unexcited ; but if once caused to sing, it will continue to sing. With such a flame, which is not too sensitive to external impressions, I have been able *to reverse the effect hitherto described*, and to stop the song at pleasure by the sound of my voice, or by a tuning-fork, without quenching the flame itself. Such a flame I find may be made to obey the word of command, and to sing or cease to sing, as the experimenter pleases.

The mere clapping of the hands, producing an explosion, shouting at an incorrect pitch, shaking of the tube surrounding the flame, are, when the arrangements are properly made, ineffectual. Each of these modes of disturbance doubtless affects the flame, but the impulses do not accumulate, as in the case where the note of the tube itself is struck. It appears as if the flame were *deaf* to a single impulse, as the tympanum would probably be, and like the latter, needs the accumulation of impulses to give it sufficient motion. A difference of half a tone between two tuning-forks is sufficient to cause one of these to set the flame singing, while the other is powerless to produce this effect.

I have said that the voice must be pitched to the note of the tube which surrounds the flame; it would be more correct to say the note produced by the flame when singing. In all cases this note is sensibly higher than that due to the open tube which surrounds the flame; this ought to be the case, because of the high temperature of the vibrating column. An open tube, for example, which, when a tuning-fork is held over its end, gives a maximum reinforcement, produces, when surrounding a singing flame, a note higher than that of the fork. To obtain the latter note the tube must be sensibly longer.

What is the constitution of the flame of gas while it produces musical sounds ?

This is the next question to which I will briefly call attention. Looked at with the naked eye, the sounding flame appears constant, but is the constancy real? Supposing each pulse to be accompanied by a physical change of the flame, such a change would not be perceptible to the naked eye, on account of the velocity with which the pulses succeed each other. The light of the flame would appear continuous, on the same principle that the troubled portion of a descending liquid jet appears continuous, although by proper means this portion of a jet can be shown to be composed of isolated drops. If we cause the image of the flame to pass speedily over different portions of the retina, the changes accompanying the periodic impulses will manifest themselves in the character of the image thus traced.

I took a glass tube 3 feet 2 inches long and about an inch and a half in internal diameter, and, placing it over a very small flame of olefiant gas (common gas will also answer), obtained the fundamental note of the tube; on moving the head to and fro, the image of the sounding flame was separated into a series of distinct images; the distance between the images depended upon the velocity with which the head was moved. This experiment is suited to a darkened lecture-room. It was still easier to obtain the separation of the images in this way, when a tube 6 feet 9 inches in length and a larger flame were made use of.

As suggested to me by a lady, to whom I had the pleasure of showing these experiments, the same result is obtained when an opera-glass is moved to and fro before the eye.

But the most convenient mode of observing the flame is with a mirror; and it can be seen either directly in the mirror, or by projection upon a screen.

A lens of 33 centimetres' focus was placed in front of a flame of common gas, upwards of an inch long, and a paper screen was hung at about 6 or 8 feet distance behind the flame. In front of the lens a small looking-glass was held, which received the light that had passed through the lens, and reflected it back upon the screen placed behind the latter. By adjusting the position of the lens, a well-defined inverted image of the flame was obtained upon the screen. On moving the mirror the image was displaced, and owing to the retention of the impression by the retina, when the movement was sufficiently speedy, the image described a continuous luminous track. Holding the mirror still, the 6-foot 9-inch tube was placed over the flame; the latter changed its shape the moment it commenced to sound, remaining, however, well defined upon the screen. On now moving the mirror, a totally different effect was produced; instead of a continuous track of light, a series of distinct images of the sounding flame was observed. The distance of these images apart varied with the motion of the mirror; and of course could be made, by suitably turning the reflector, to form a ring of images. The experiment is beautiful, and in a dark room may be made visible to a large audience.

The experiment was also varied in the following manner:—A triangular prism of wood had its sides coated with rectangular pieces of looking-glass: it was suspended by a thread with its axis vertical; torsion was imparted to the thread, and the prism acted upon by this torsion caused to rotate. It was so placed that its three faces received in succession the beam of light sent from the flame through the lens in front of it, and threw the images upon the screen. On commencing its motion the images were but slightly separated, but became more and more so as the motion approached its maximum. This once past, the images drew closer together again, until they ended in a kind of luminous ripple. Allowing the acquired torsion to act, the same series of effects could be produced, the motion being in an opposite direction. In these experiments, that half of the tube which was turned towards the screen was coated with lamp-black, so as to cut off the direct light of the jet from the screen.*

But what is the state of the flame in the interval between two images? The flame of common gas, or of olefiant gas, owes its luminousness to the solid particles of carbon discharged into it. If we blow against a luminous gas-flame a sound is heard,

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* Since these experiments were made, Mr. Wheatstone has drawn my attention to the following passage, which proves that he was the first to make use of the rotating mirror in examining a singing flame:—"A flame of hydrogen gas burning in the open air presents a continuous circle in the mirror; but while producing a sound within a glass tube, regular intermissions of intensity are observed, which present a chain-like appearance, and indicate alternate contractions and dilatations of the flame corresponding with the sonorous vibrations of the column of air."—*Phil. Trans.*, 1834, p. 586.

a small explosion in fact, and by such a puff the luminousness may be caused to disappear. During a windy night the exposed gas-jets in the shops are often deprived of their light, and burn blue. In like manner the common blowpipe-jet deprives burning coal-gas of its brilliant light. I hence concluded that the explosions, the repetition of which produces the musical sound in the case before us, rendered, at the moment they occurred, the combustion so perfect as to extinguish the solid carbon particles, but I imagined that the images on the screen would, on closer examination, be found united by spaces of blue, which, owing to their dimness, were not seen by the method of projection. This in many instances was found to be the case.

I was not, however, prepared for the following result:—A flame of olefiant gas, rendered almost as small as it could be, was procured. The 3-foot 2-inch tube was placed over it; the flame on singing became elongated, and lost some of its light, still it was bright at its top; looked at in the moving mirror, a beaded line of great beauty was observed; in front of each bead was a little luminous star, after it, and continuous with it, a spot of rich blue light, which terminated, and left, as far as I could judge, a perfectly dark space between it and the next following luminous star. I shall examine this further when time permits me, but as far as I can at present judge, the flame was actually extinguished and relighted in accordance with the sonorous pulsations.

When a silent flame, capable, however, of being excited by the voice in the manner already described, is placed within a tube, and the continuous line of light produced by it in the moving mirror is observed, I know no experiment more pretty than the resolution of this line into a string of richly luminous pearls at the instant when the voice is pitched to the proper note. This may be done at a considerable distance from the jet, and with the back turned towards it.

The change produced in the line of beads, when a tuning-fork capable of giving beats with the flame is brought over the tube or over a resonant jar near it, is also extremely interesting to observe. I will not at present enter into a more minute description of these results. Sufficient, I trust, has been said to induce experimenters to produce the effects for themselves; the sight of them will give more pleasure than any description of mine could possibly do.—*London, Edinburgh, and Dublin Philosophical Magazine.*

TWENTY-SEVENTH MEETING OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Dublin, August 26th.

After the preliminary business of the Association, the First General Meeting of the Members was held in the Rotunda at eight o'clock, when Dr. Daubeny resigned the Chair, and the Rev. Humphrey Lloyd, D.D., was elected President. Dr. Lloyd then delivered his address.

The officers for the Chemical Section were :—*President*, Dr. Apjohn. *Vice-Presidents*, Prof. Andrews, Prof. Davy, Rev. W. V. Harcourt, Prof. Miller, Dr. Lyon Playfair, Prof. Wilson. *Secretaries*, Dr. Gladstone, Prof. Sullivan, Dr. Davy. *Committee*, Dr. Aldridge, Dr. Becker, Prof. Bolsani, Prof. Daubeny, M. Donovan, Dr. Edwards, Lord Otho Fitzgerald, Dr. Forbes, G. C. Foster, A. Gages, J. P. Gassiot, Dr. Geoghegan, Dr. Gilbert, Prof. Haughton, Dr. Head, G. Lowe, Dr. Liveing, Dr. Macadam, Prof. Mallet, Dr. Moore, the Abbé Moigno, Dr. Odling, Dr. Pugh, Prof. Rodgers, Prof. Rowney, W. S. Ward, Prof. Voelcker, Dr. Williams, Dr. Wood, J. Young.

The following were among the papers read at some of the Sections:—

ON A METHOD OF REFINING SUGAR.

Dr. Daubeny gave an account of a new method of refining sugar, conducted at Plymouth by Mr. Oxland, and known by his name. It consists in the adoption of the superphosphate of alumina in conjunction with animal charcoal, as a substitute for the albumen usually employed for that purpose. In both cases the object is to separate and carry down the various impurities which colour and adulterate the pure saccharine principle present in the syrup expressed from the cane or other vegetable which supplies it. As, however, bullocks' blood is the material usually procured for the purposes of supplying the albumen, a portion of the uncoagulated animal matter,

together with certain salts, is left in the juice in the ordinary process of refining, which impairs its purity and promotes its fermentation, thus occasioning a certain loss of saccharine matter to result. Nothing of the kind happens when the superphosphate is substituted, and so much more perfect a purification of the feculent matters, under such circumstances, takes place, that several varieties of native sugar, which, from being very highly charged with feculent matters, are rejected in the ordinary process of refining, are readily purified by this method. The employment of superphosphate of alumina also gets rid of so much larger a proportion of the impurities present in the sugar, that much less animal charcoal is subsequently required for effecting its complete defecation than when bullocks' blood has been resorted to. The quantity of superphosphate necessary for effecting the object is, for ordinary sugars, not less than twelve ounces to the ton; whereas, for the same quantity, as much as from one to four gallons of bullocks' blood is found to be required. Dr. Daubeny suggested that this reagent might be advantageously resorted to not only in the purification of sugar, but also in other processes of the laboratory, when the removal of foreign matters, intimately mixed with the solution of a definite component, becomes a necessary preliminary in its further examination.

ON A NEW METHOD OF FORMING AMMONIO-IODIDES OF METALS.

BY THE REV. J. B. READE.

It is only within the last few years that the attention of Chemists has been directed to the compounds of metals with iodine and ammonia. The fifth edition of Brande's *Chemistry*, published in 1841, is silent on the subject. At the Oxford Meeting of the British Association, in 1847, I exhibited the ammonio-iodide and periodide of gold, and since that time other experiments on other metals have furnished me with results which perhaps may be of some interest to the Chemical Section.—*Solution of Iodine in Ammonia.* Perhaps the best mode of dissolving iodine in ammonia for the purpose in question, is to place about 50 or 60 grains of iodine in an evaporating dish, hold it over the spirit-lamp till thoroughly warm and the vapour arises, and then add a few drops of Liquor Ammoniæ, which will be immediately charged with a large excess of iodine in solution. This may be poured into a bottle and more iodine and ammonia added, until the requisite supply is obtained.—*Ammonio-iodide of Gold.* Gold-leaf when placed in the iodine solution instantly turns black, (a purple if the solution be diluted), and immediately dissolves, like sugar in water. If left to evaporate spontaneously in some quantity, we obtain black four-sided prisms of the ammonio-per-iodide, which readily dissolve in water; and if a very weak solution be exposed for some months to the direct action of the sun's rays, a slight precipitate appears, and a drop or two of the clear solution furnishes a most striking microscopic object both as to crystalline arrangement and richness of tint when placed in polarized light.—*Ammonio-iodide of Silver.* Gmelin says of the ammonio-iodide of silver, that "unfused iodide of silver absorbs with evolution of heat 3.6 per cent. of ammonia, and forms a white compound, which on exposure to the air gives off ammonia and turns yellow again." The phenomena are far more interesting when silver leaf is added to the ammonia solution of iodine. The metallic silver is dissolved, and when a few drops are placed on a slip of glass beautiful brushes of prismatic crystals shoot out in all directions, which may be mounted as a microscopic object in Canada balsam after the excess of iodine is spontaneously evaporated. Under polarized light the colours of the crystals are brilliant in the extreme.—*Ammonio-iodide of Mercury.* The phenomena in forming this compound are varied and interesting. Mercury is added to the iodine solution, and after the application of heat and the addition of a little water, a few drops on a slip of glass give bundles of permanent prismatic crystals, similar to those of silver, and acted on with the same energy by polarized light. If ammonia be added to these crystals, they are immediately covered with tufts of snowy whiteness, and by degrees they are converted into ruby-coloured hexagonal prisms, which are also permanent.—*Ammonio-iodide of Cobalt.* Brande observes that "no precipitate is produced in solutions of cobalt either by hydriodic acid or iodide of potassium, or by iodic acid or iodate of potassa." I find, however, that cobalt yields to the action of the ammonio-iodide solution after some hours' digestion and a little heat and water. As might be expected, it exhibits very strongly the sympathetic properties of the chloride, for when placed on paper and gently heated it becomes a brilliant green, which of course vanishes as the paper cools.—*Ammonio-iodide of Titanium.* As titanium, which re-

sists every direct method of attack in the laboratory, yields after a period of digestion in the iodine solution, it is probable that other of the scarcer metals, which are with difficulty reduced by the ordinary methods, might be exhibited in the form of ammonio-iodides, and thus throw additional light on their respective equivalents. The crystals of ammonio-iodide of titanium which I have obtained were from a pure specimen of the metal obtained by Mr. Waterhouse, of Halifax, from the slag of the neighbouring iron-furnaces at Low Moor.—*Ammonio-iodide of Aluminium.* In forming this compound I did not, as on other occasions, use the pure metal, but alumina only, precipitated in the usual way. After allowing the alumina to digest for some time in the iodine solution, the whole was boiled in a little water, which dissolved the new compound, and upon evaporation and the proper measure of heat to volatilize the excess of iodine and ammonia, a white semi-metallic substance remained, as in the case of silver. It is soluble in dilute hydrochloric acid, and yields a blue precipitate on the addition of yellow prussiate of potash. Whether any use can be made of this process towards obtaining the pure metal is of course a problem for practical men.

ON THE DENSITIES OF BODIES IN THE SOLID AND MOLTEN STATES.

BY MR. J. NASMYTH.

The author stated, on introducing the above subject to the notice of the Section, that his object in so doing was to direct the attention of scientific men to a class of phenomena which although in their main features they might be familiar to practical men, yet appeared to have escaped the attention of those who were more engaged in scientific research. The great fact which he desired to call attention to is comprised in the following general proposition,—namely, that all substances in a molten condition are specifically heavier than the same substances in an unmolten state. Hitherto water has been supposed to be a singular and special exemption to the ordinary law,—namely, that as substances were elevated in temperature they became specifically lighter, that is to say, water at temperature 32° on being heated does on its progress towards temperature 40° become more dense and specifically heavier until it reaches 40°, after which, if we continue to elevate the temperature, its density progressively decreases. From the facts which Mr. Nasmyth brought forward, it appears that water is not a special and singular exception in this respect, but that, on the contrary, the phenomenon in relation to change of density (when near the point of solidification) is shared with every substance with which we are at all familiar in a molten state, so entirely so, that Mr. Nasmyth felt himself warranted in propounding, as a general law, the one before stated,—namely, that in every instance in which he has tested its existence he finds that a molten substance is more dense, or specifically heavier, than the same substance in its unmolten state. It is on account of this that if we throw a piece of solid lead into a pot of melted lead, the solid, or unmolten metal, will float in the fluid, or molten metal. Mr. Nasmyth stated, that he found that this fact of the floating of the unmolten substance in the molten holds true with every substance on which he has tested the existence of the phenomenon in question. As, for instance, in the case of lead, silver, copper, iron, zinc, tin, antimony, bismuth, glass, pitch, rosin, wax, tallow, &c.; and that the same is the case with respect to alloys of metals and mixtures of any of the above-named substances. Also, that the normal condition as to the density is resumed in most substances a little on the molten side of solidification, and in a few cases the resumption of the normal condition occurs during the act of solidification. He also stated that, from experiments which he had made, he had reason to believe that by heating molten metals up to a temperature far beyond their melting point, the point of maximum density was, as in the case of water, at 40° about to be passed; and that at such very elevated temperatures the normal state, as regards reduction of density by increase of temperature, was also resumed, but that as yet he has not been able to test this point with such certainty as to warrant him to allude further to its existence. Mr. Nasmyth concluded his observations by stating, that he considered this to be a subject well worthy of the attention of geologists, who might find in it a key to the explanation of many eruptive or upheaving phenomena which the earth's crust, and especially that of the moon, present,—namely, that on the approach to the point of solidification molten mineral substances then beneath the solid crust of the earth must, in accordance with the above-stated law, expand, and tend to elevate or burst up the solid crust,—and also express upwards, through the so cracked

surface, streams more or less fluid of those mineral substances which we know must have been originally in a molten condition. Mr. Nasmyth stated, that the aspect of the lunar surface, as revealed to us by powerful telescopes, appeared to him to yield most striking confirmation of the above remark. He concluded by expressing a hope, that the facts which he had brought forward might receive the careful attention of scientific men, which their important bearing on the phenomena in question appeared to him to entitle them to.

A gentleman in the Section asked Mr. Nasmyth whether the facts well known to chemists, that cast iron, and one or two other metals, in the act of solidifying enlarged so as to fill out sharply the minute parts of the mould—which was indeed the property on which their great use chiefly depended—were not at variance with this general principle?—Mr. Nasmyth replied, that, so far from that, they were the most striking examples of its application.

ON THE EMPLOYMENT OF THE LIVING ELECTRIC FISHES AS MEDICAL SHOCK MACHINES.

BY PROF. G. WILSON.

The author stated that, in prosecuting researches into the early history of the electric machine, he did not at first contemplate going further back than the seventeenth century, or commencing with any earlier instrument than Otto Guericke's sulphur globe of 1670. His attention, however, had been incidentally directed to the employment of the living torpedo as a remedial agent by the ancient Greek and Roman physicians; and he now felt satisfied that a living electric fish was alike the earliest and the most familiar electric instrument employed by mankind. In proof of the antiquity of the practice, he adduced the testimony of Galen, Dioscorides, Scribonius, and Asclepiades, whose works proved that the shock of the torpedo had been used as a remedy in paralytic and neuralgic affections before the Christian era. A still higher antiquity has been conjecturally claimed for the electric Silurus, or Malapterurus of the Nile, on the supposition that its Arabic name, *raad*, signifies thunder-fish, and implies a very ancient recognition of the identity in nature of the shock-giving power and the lightning force; but the best Arabic scholars have pointed out that the words for thunder (*raad*) and for the electric fish (*raâd*) are different, and that the latter signifies the "causer of trembling," or "convulser;" so that there are no grounds for imputing to the ancient Egyptians, or even to the Arabs, the identification of Silurus-power with the electric force. In proof of the generality of the practice of employing the living zoo-electric machine at the present day, the author referred to the remedial application of the torpedo by the Abyssinians, to that of the gymnotus by the South American Indians, and to that of the recently-discovered electric fish (*Malapterurus Beninensis*) by the dwellers on the old Calabar River, which flows into the Bight of Benin. The native Calabar women are in the practice of keeping one or more of the fishes in a basin of water, and bathing their children in it daily, with a view to strengthen them by the shocks which they receive. These shocks are certainly powerful, for living specimens of the Calabar fish are at present in Edinburgh, and a single one gives a shock to the hand reaching to the elbow or even to the shoulder. The usages referred to appear to have prevailed among the nations following them from time immemorial, so that they furnish proof of the antiquity as well as of the generality of the practice under notice. The author concluded by directing the attention of naturalists to the probability of additional kinds of electrical fish being discovered, and to the importance of ascertaining what the views of the natives familiar with them are in reference to the source of their power and to their therapeutic employment.—Sir J. Richardson stated that there were not less than eleven genera of fishes known that had the power of giving electric shocks. There was one peculiarity in all these fishes, and that was the absence of scales. In every one of them an apparatus had been discovered, which consisted of a series of galvanic cells put in action by a powerful system of nerves. He read extracts from a letter from Dr. Baikie, now engaged in exploring the Niger, in which that gentleman stated that he had met with an electric fish in Fernando Po, and which Sir J. Richardson believed was identical with the Malapterurus, which had been described by Dr. Wilson, from the coast of Old Calabar. The natives called this fish the Tremble-fish.

The Report of the Committee appointed to investigate the

VITALITY OF SEEDS

was read, at the *Botanical Section*, by Dr. Daubeny, of Oxford. From the register of the experiments performed by Mr. Baxter of the Botanic Garden, it would appear that the shortest period for which any of the seeds had retained their vitality was eight years, and the longest forty-three years. The following groups will give some idea of the plants whose seeds retain their vitality longest:—Gramineæ 8 years, Liliaceæ 10 years, Coniferæ 12 years, Tiliaceæ 27 years, Malvaceæ 27 years, Leguminosæ 43 years, Rhamnaceæ 21 years, Borragineæ 8 years, Convolvulaceæ 14 years, Compositæ 8 years, Myrtaceæ 18 years, Umbelliferæ 8 years, Cruciferæ 8 years.

CHINESE POISONS.

BY D. J. MACGOWAN, M.D., NINGPO.

[The writer of the following has resided in China, engaged in medical practice, during the last thirteen years. His extensive acquaintance with the Chinese language, and with the literature of Chinese science, is such as to justify confidence in the accuracy of his statements.—Ed. *Edinburgh Medical Journal.*]

In consequence of the atrocious attempt of the Cantonese to poison the foreign community at Hong-Kong, applications have been made to us from various quarters for information on poisons known to the Chinese. An investigation of Chinese toxicology would require much time and special study, which we despair of being able to devote to that interesting subject. In default of presenting anything of value to the scientific inquirer, we submit for the perusal of the general reader the limited information we possess on Chinese poisons. From the period of the Han dynasty to the present day poisoned arrows have been employed both in the chase and in warfare; less, however, by the Chinese proper than by the so-called Aborigines, or Miautsz. In the hands of the latter they are formidable weapons. Instant death is inevitable from the slightest abrasion. The Chinese possess no agents for counteracting the poisons of the hill tribes; the *Pun Tsau* states that these Inner Barbarians apply borax sometimes with success to poisoned wounds; and it is commonly reported that for their various virulent poisons they possess perfect antidotes.

We are acquainted with only one of the *inoculating* poisons of the Chinese—a watery extract of the root of *tsau-wú*—a perennial creeper found on the hills of the central provinces. Its botanical character, as well as its precise physiological action, we have yet to ascertain. Its active principle appears to be highly volatilizable, and great exactness is needed in preparing it. Small animals are kept in readiness for testing the strength of the extract: they are punctured with a point charged with the poison; and when its virulence is sufficient to occasion instant death, it is boiled no longer. A native physician who saw it prepared by the hunters of the adjacent district of Funghwa, states that sometimes they prick their arms to let blood flow to the wrist, and, after carefully wiping the part near the wound, apply some of the pasty extract to the lower end of the line of blood, which it rapidly blackens through its whole length; and it is affirmed, that were the continuity with the incision unbroken, the morbific action of the subtile agent would penetrate the wound and prove quickly fatal. It is sometimes applied to the tongues of the unwary as a practical joke—when it occasions a keen sensation of formication. The dried root is administered where the nerves of motion are impaired. The Funghwa hunters traverse in winter the mountainous regions of Chihkiang in pursuit of tigers, that are sometimes taken by being pierced with arrows, the necks of which are bound with filaments of cotton saturated with the poison; at other times, springs, charged with these arrows, are adjusted near the lair of the animal for his destruction. When a limb is struck, the beast writhes awhile before expiring, but, when wounded in the body, he leaps forward, staggers and falls dead immediately. Attached to the imperial body-guard is a corps of hunters, who, when on the chase in pursuit of edible game, provide themselves with envenomed missives to be employed against wolves.

Latterly, poisoned arrows have fallen into comparative disuse as implements of

war, owing to an increasing familiarity with fire-arms. We are acquainted with the contriver of a machine which was designed to be used against the English during the late war. It succeeded so well in picking off goats which were led over the cords communicating with it, that the military commission strongly recommended its adoption for destroying barbarian bipeds. Unfortunately for the patriotic inventor, the treaty of Nanking caused the dispersion of the game, just as it was, as he supposed, about to be largely bagged. It need hardly be added that, in the hands of assassins, this easily obtainable poison would prove a potent means of destruction; as a slight puncture of an instrument charged with it, would, from its rapid absorption, be a sure *coup de grace.*

It is not our purpose to point out all the virulent agents which unscrupulous Chinamen are likely to employ against an enemy. We shall only add one more of the inoculating class, and that chiefly on account of its novelty. When the late commissioner Lin was devising means for the extirpation of English barbarians at Canton, some of the gentry of that city actually proposed to H. E. to rid the place of certain prominent and obnoxious individuals by infecting them with *leprosy.* Lin indignantly rejected the proposition as unbecoming a civilized people. That Chinese statesman was a brave and honourable man; his present Manchu successor has no claim to such virtues. His chief objection to the use of leprous virus would be, it is said, the tardiness of its action; it is believed that more than a month elapses after the introduction of the animal poison, before it begins to show itself in its victim. Our knowledge of this foul malady is too imperfect to justify us in pronouncing such an inoculation as impracticable.

There are poisons also which are *inhaled.* A person, who aided a magistrate in the administration of a poison of this class, gives the following narrative of the transaction, which was a *filicide.* (Our apology for coining this word is, that it is needed to denote a crime, or rather extra-judicial practice, not uncommon in China: resorted to for making away with dangerous adult sons.) The son of that officer was a lawless and incorrigible character, who by misdemeanours perilled the safety of his family, and they determined on his removal. To effect that object without publicity, no small finesse was requisite on the part of his father and friends. Suspecting their designs, he became excessively wary. On the day agreed upon for his execution, the father feigned to be withholding the son's much loved opium, until he could induce the hapless youth to take a draught of tea, which he was artfully led to suppose was drugged. At length, affecting to be wearied by the son's contumacy, the father gave him his opium pipe, mixing with the genial papaver another drug intensely venomous. After a few inhalations, the victim fell into a stupor, which was followed by convulsions, to which his athletic frame succumbed in less than six hours. Lest it be thought that, in publishing an account of this smokable poison, we are fulminating an insidious "counterblast" against tobacco, we would state that few except the mandarins are in possession of the secret; or, if there is no comfort in that to the lovers of cheroots, we add, that, unlike arsenic, this noxious agent renders dying tolerably easy.

To the same class belong those drugs which are employed by burglars for stupifying the inmates of the house to be robbed. Ever since we read in Commissioner Lin's anti-opium diatribe, references to medicines used by robbers, kidnappers, and sorcerers, which that statesman compared to the prohibited narcotic, we have been vainly endeavouring to investigate their nature. There is, however, abundant evidence that such agents are employed to induce stupor for criminal purposes.

Kidnapping male children for sale in Siam or the Straits has long been a common practice on the seaboard, and, a short time since, to meet the demand for Chinese females in Cuba, many girls were kidnapped. The provincial capital—Hangchau, was thrown into consternation in consequence of the paucity of slave labour in the West Indies. Popular placards and official proclamations were posted everywhere, warning the inhabitants against the villanous agents of foreign barbarians, who were prowling in search of female children. Two miscreants were detected with their little prizes, and immediately beaten to death. From the documents published on that occasion, it appears that, for very young children, a drug is employed, which, on being applied to the face, produces a degree of insensibility enabling the operator to lead the little one away unresistingly. For those of a larger growth, as well as for adults, something is given, which, by irritating the throat, causes aphony. At other times they seem to employ an anæsthetic for criminal purposes.

We must adduce one instance of a proposal to stupify by drugs of this character. When Ningpo was in possession of the English, a bold effort was made for its recapture by surprise. A large number of "braves" were secretly housed in the city, and a few hours before the time appointed for rising, the mandarins sent for distribution among a portion of the concealed force, a quantity of stupifying drug in the form of pastiles. Arrangements were made for a simultaneous attack on the West and South gates by night, and, while some of those within the city were to set off noxious vapour in houses occupied by the English, others were to force open the gates. The plot failed through the dilatoriness of the fumigating squad. They arrived too late. The noise of the attack aroused the English, and its partial success enabling a large force to enter the city caused a dreadful carnage among the spirited assailants. Yet their confidence in the utility of fumigation was not impaired; for it was not long after that a barbarian soldier was captured by this means and beheaded. Many were the plans set afoot for the capture of the English chief *Pu-ting-ché*—for whose head ten thousand teals were offered. At the present juncture, our friends at the South, whose heads are of any particular value—we mean in the Chinese market, would do well to keep their eyes open.

It is said that not far from every poison its antidote may be found. These soporific pastiles come within that rule. The difficulty in poisoning cases is to know where to look for the desired neutralizer. That our toxicological notes may not be wholly devoid of practical information, we shall give some simple directions for the guidance of those whose premises are invaded by fumigators. It is assumed that you are wide awake at the time, for, if you are caught napping, there is no remedy. In the first place then, take care that you do not bawl out. Shut your mouth. Hold your breath. Rush at the intruder—seize his tail in your left hand, and with the thumb and index finger of the right, lay hold of his nose, just above the alae, with a firm grip, and a bolus will plump out of each nostril, with which you are to plug your own nasal passage (do not be fastidious) and you may then commence breathing (your mouth still closed), for these medicated pledgets possess the property of decomposing the somnolent gas. If successful in these manipulations, you will have the gratification of seeing your foe gasp and tumble over, *hors de combat*, into the pit he had prepared for you. Allusions are often made to a mysterious and extremely virulent poison taken by men of high rank when on the eve of execution: it is derived, according to vulgar belief, from a protuberance on the head of a species of stork. Whatever the agent may be, it is unquestionably one of great potency. An officer, who was eye-witness to the decapitation of the venerable and lamented General Yu Tsien, informs us that, when the victim of Manchu malignancy was led out to slaughter, something was placed on the tip of his tongue, which, without the infliction of pain, rendered him insensible in less than half an hour. Friendly mandarins then retained his moribund frame in an erect posture to receive the painless death-blow.

Nearly all the vegetable and mineral poisons known in the West are found in China, and have been employed for homicidal or suicidal purposes. Laurel water, hemlock, hyosciamus, belladonna, stramonium, nux vomica, and a long list of other indigenous plants, known and unknown, are always at hand, though not often employed, owing to the facility of obtaining opium. Dogs are often poisoned by thieves by giving them rice in which nux vomica has been boiled. It is not an uncommon practice for countrymen to throw an infusion of croton tiglium into a pond, a mode of fishing made easy:—the morning following the operation every fish is found floating on the surface dead. They are then taken to market, but, though somewhat insipid, are innoxious. Some species of fish found on the coast are intensely poisonous, as of course are several kinds of mushrooms, which, with other edible poisons, are employed by those who aim at robbery or murder. For suicide, after opium, the most common agent is the sediment of brine—which is highly corrosive. Pure gold is not uncommonly used; it probably acts in the same manner. Quicksilver has also been used for the same purpose; we are uninformed respecting its action. Arsenic, although cheap and abundant, is not easily procured, vendors being held responsible for consequences, whether suicide or murder. The yellow, or sesqui sulphuret (*orpiment*) abounds in Kunchâng in the S.W. of Kansuh. It is employed externally to venomous wounds; as a sternutatory to counteract miasmatic effluvia in summer, and internally, as a tonic in several diseases, and as a prophylactic; on the fifth day of each fifth month, persons of every age and condition drink

spirituous liquor in which some powdered orpiment has been thrown, under the belief that it is preventive of epidemic diseases. The Chinese do not consider this mineral as related in any way to arsenic. By arsenic, they mean the red or proto-sulphuret (*realgar*). This mineral is found abundantly in Sinyang — Honan, arsenious acid (*white oxide*) is also met with, a collateral product, it is said, in some glass work, derived doubtless from an ore of cobalt. The sulphurets were known to the ancient alchemists of China, and were early employed in medicine; the utility of the last named in intermittent fever has not been long known, says the Pun Tsau—Materia Medica. Water, in which common green bean has been boiled and pounded, is given in cases of arsenic poisoning. It can be of use only as a demulcent. We are told that Mongolian hunters beyond the Wall eat it to enable them to endure cold, when patiently lying on the snow to entrap martens. In this part of China, arsenic is taken by divers, who, in cold weather, plunge into still water in pursuit of fish, which are then found hybernating among stones at the piers of bridges. We perceive with regret that the modern Chinese have added arsenic to their habitual stimulants. The red sulphuret in powder is mixed with tobacco, and their joint fumes are smoked in the ordinary manner. We have met with no habitual smokers of this compound of mineral and vegetable poisons; but persons who have made trial state that dizziness and sickness attend first attempts. After a few trials, arseniated tobacco may be taken without any apparent inconvenience. From reports given of it we infer that its effects on the Chinese are analogous to what is observed among the arsenic-eating peasants of Austria. The use of arsenical vapour by inhalation merits the attention of physicians as a remedial agent.

At Peking, where arseniated tobacco is most in use, it costs no more than the unmixed article; it may be known by the red colour imparted to the vegetable by the powdered proto-sulphuret. Its introduction is attributed to Cantonese from Chau-chau. If this be correct, it is probable that these Southerners, unable at the North to procure the masticatory to which they are addicted, sought to appease a craving for the pungent but harmless lime and betel-nut, by substituting the deleterious mineral gas. Many of the miserable victims of opium, to whom that narcotic is a necessity and not a pleasure, have eagerly employed the new stimulant to prop and exhilarate their exhausted bodies, and, perhaps, have thereby meliorated and prolonged their existence. We would fain hope that the use of arsenical stimulants will not become general; yet that pernicious custom is extending, and we know our race too well not to entertain fears on the subject. It is even stated that, for a time at least, the reigning Emperor in his boyhood preferred tobacco thus mineralized. Arsenical ores are used in the arts. In domestic economy, the red sulphuret is employed for making away with rats and husbands.

There is no evidence that poisoning as an art has been practised in China, and we search her annals in vain for a case parallel to that of Hong-Kong. Novelists sometimes describe the poisoning of armies or large numbers of people—the account of the aboriginal chief Manghwoh, who poisoned the springs of which the Chinese army drank, will recur to the reader of the historical romance—the Three States. It may be that instances of this kind are founded on fact: but the obvious futility of any attempt to poison fatally on a large scale is a guarantee that it will be seldom resorted to in warfare. Could such appliances be made subservient to the destruction of masses of men, they would certainly be put in requisition, as total annihilation of antagonists is always the aim of Chinese heroes—"no quarter" is their war-cry and "peculiar institution."—*Edinburgh Medical Journal.*

Ningpo, March 2nd, 1857. D. J. M.

CHEMICAL WRITING WITHOUT INK.

BY ALEXANDRE TOLHAUSEN.

This invention consists in a process for producing chemical marks or writing on paper, without using a liquid like common inks, by employing chemically prepared paper, and a chemically prepared pencil, style or other like instrument, to trace, write, or mark on the paper; whereby the salts or substances in the pencil and paper, when they come in contact, will chemically unite under hygroscopic conditions at the natural temperature of the atmosphere, and will form visible chemical coloured marks or writing on the paper. Hygroscopic conditions are necessary to

the process to effect chemical writing; moisture is the agent which enables the salts or substances used to effect chemical union, but no liquid is employed.

To prepare the paper, the common sizing that is used for writing-paper is saturated with a salt or salts, or substances of considerable solubility, and which, when dried with the paper, will maintain its dryness and freedom from moisture under ordinary atmospheric changes. Colourless salts or substances are preferred for this purpose, or they may be of such a light tint as not to be different from the colour of writing-paper. This salt or salts, or substance, is to form the ground for the coloured marks or writing to be produced on the paper. Various salts may be used for this purpose, according to the colour of the marks or writing to be produced. For instance, to produce blue marks or writing, the paper is prepared with ferrocyanide of ammonium, which is very soluble in water, or with salicylic salts. To make black marks or writing, indigotic salts and morphine salts are used. To make red marks, meconic salts, pyromeconic salts, and angelic salts are used. To produce green writing or marks, the paper is prepared with caffeic or theic salts. These salts, either singly or a mixture of those specified for each colour, are mixed with the sizing of the paper, which is applied in the usual manner, and the paper is afterwards dried and pressed in the common way. No certain quantity of these salts requires to be described, but about one ounce of any of them is sufficient to impregnate the sizing for about half a ream of common foolscap paper: a lesser quantity being used to produce feebler colours, and more to produce darker shades. Other well-known salts than those specified may also be used, but those named will effect the results herein described—the principal feature of this invention being to produce chemical writing without an ink. The patentee now takes a deliquescent salt, and for cheapness he prefers a ferric oxide—the nitrate, chloride, or sulphate of iron, obtained in any of the usual methods. This salt is triturated and mixed intimately with plastic clay, in about the quantities of an ounce of salt to a like quantity by weight of clay or similar substance. The ferric clay is then moulded into any desired form to constitute a pencil or tracing instrument, and is afterwards baked in an oven, to drive off the moisture by heat. The heat is continued, at about 212° Fah., to drive off all the moisture and to harden the clay. When this is accomplished, the ferric pencil or tracer is removed from the oven or other place, and plunged into molten bees'-wax, spermaceti, or any substance of similar character, which will form an air-tight coating, and not decompose the ferric salt. The chemical pencil or tracer thus produced may be placed between strips of wood, like a common lead-pencil, or it may be placed in a metal pencil-case, and the point of it scraped to expose it to the air. The chemically-prepared paper previously described is now traced, pressed, or written upon with the pencil or instrument described. The ferric salt in the said pencil during the act of writing, when exposed to the atmosphere, absorbs moisture; and when it (the ferric salt) comes in contact with the salt or substance in the prepared paper, the salts or substances in the pencil and paper unite chemically (forming double decomposition), producing a new ferric compound in the prepared paper, and thereby producing chemical coloured characters, marks, or writing. Any of the ferric salts named for the pencil will produce the different colours mentioned on paper prepared with the substances heretofore specified for producing these colours. The pencil or tracer may also be made of a very porous substance, which may be steeped in a solution of ferric salt, then dried to expel the moisture, leaving the salts in fine crystals in its pores; it is then plunged into bees'-wax as described for the above-described pencil, and for the same purpose. Type may be formed in the same manner as the ferric clay pencil described, and chemical printing may be executed without the use of common topical ink, which in some cases may be advantageous. A very porous fountain pencil may also be made, one whose pores will permit fine ferric salt to percolate as it were through them, and be transmitted to the paper in the act of tracing or writing, and impressed on the paper by a hard point on the pencil, to bring the salt or salts in the pencil and prepared paper into contact, when the two will unite under hygroscopic conditions of the ferric salt, and produce the chemical marks and writing heretofore described.

Another method of obtaining the hygroscopic condition necessary to form a chemical union between the salt or substance in chemically prepared paper and a pencil, without employing a deliquescent salt to produce chemical writing on paper, is to use glycerine as a component part of the chemical pencil or marker. Without

the employment of a solution it will afford the same requisite amount of moisture as a deliquescent salt. Paper prepared with starch as a sizing, will produce blue marks or writing, if it be traced upon with a porous pencil or fountain pencil, containing iodine and glycerine—the latter not being present as a liquid, but simply as a hygroscopic agent.

Another method of producing the same chemical marks or writing on paper as those described, is to prepare the paper in the same manner as that first described, and employ a dry salt in the pencil, and supply the hygroscopic conditions necessary to form the chemical union of the chemically prepared paper and pencil during the act of writing or tracing, by placing a moist sheet of paper under the paper to be written upon, or they may be supplied, after tracing or writing, by pressing a sheet of moistened paper on the written or traced surface; by either of which acts the salts will receive the necessary supply of moisture to enable them to form double decomposition, and produce chemical marks or writing on the paper. The salt or salts preferred for making the dry salt chemical pencil, for producing chemical writing or marking of the character described, are the tartrate of iron, the persulphate of iron, or any of the permanent iron salts.

Heretofore it has been a desideratum to obtain a superior substitute for the common lead or plumbago pencil and the crayon, and also for the method of writing with a fluid-like ink. The lead pencil and crayon only make mechanical marks which are easily erased, and writing with ink is troublesome, because the pen has to be often replenished.

This improved method or process will produce chemical marks or writing equal to those made by inks; and the method of writing or producing them is as easy as the act of writing with a common pencil. It will be a superior method of writing on books and bills, and making permanent records on paper. It will afford security against alteration of the writing on records, as it will require the specific salts in the pencil and paper to produce a writing similar in colour and shade to that which is attempted to be supplanted, changed, or altered, and to that on the part of the document written upon. This process obviates the evils and objections incident to the use of a common pencil, or pen and ink.

The patentee claims "producing chemical marks, records, or writing, on chemically prepared paper, as described, by tracing, pressing, or writing with a chemically prepared pencil, style, tracer, type, or other suitable instrument, on such paper, under the hygroscopic conditions herein described, or in any manner substantially the same."—*Journal of the Franklin Institute.*

ON THE PRODUCTION OF WHITE SAPPHIRES IN ISOLATED LIMPID CRYSTALS, BY MEANS OF THE BLAST-FURNACE, IN ORDINARY CRUCIBLES.

BY A. GAUDIN.

More than twenty years ago, I obtained artificial rubies by fusing with the oxyhydrogen blowpipe ammoniacal alum with the addition of $\frac{5}{1000}$ths of yellow chromate of potash. These rubies were identical with native rubies in regard to their chemical composition, their hardness, and colour, but they were deficient in limpidity, in consequence of a partial crystallization, which I have as yet been unable to avoid with large globules.

At this period I also obtained a geode of corundum in crystals discernible with the naked eye, and giving the sextuple cleavage peculiar to this mineral; it was produced by fusing a fragment of potash-alum in a crucible of lamp-black with a platinum blowpipe. The blowpipe which hung over the crucible was fused during the operation, so much that several globules of platinum were implanted in the crystals of the geode; before cooling, the globule was limpid, but in crystallizing it became hollow and slightly milky.

500 grms. of the same alum which I sent to Brongniart to be calcined in the porcelain furnace at Sèvres, were converted, to the great astonishment of that celebrated mineralogist, into a heavy mass with brilliant particles, which was a true artificial compact corundum.

When, ten years later, Ebelmen made use of boracic acid, he was not unaware o-

the part which was played by potash in the formation of the corundum of Brongniart his predecessor; but the series of characteristic crystals which he was able to make by this means, constituted a work out of the direct line, which I admired as much as any one, so much indeed that I never made any reclamation when I found that in the historical account of his researches mine were entirely omitted ; and if I speak of it now, it is to show that my new results also possess a character which distinguishes them from his.

In fact, I wished to obtain, not concretions, like Ebelmen, by *completely* evaporating the solvent, but rather isolated crystals, by evaporating the solvent *partially*, or by originating a slow refrigeration, suited to increase crystals suspended in a pasty liquid. It is to the realization of these two conditions that the first success which I have to submit to the Academy is to be attributed.

To produce limpid crystals of alumina, I introduce into a common crucible, luted with lamp-black, equal parts of alum and bisulphate of potash, previously calcined and reduced to powder, and submit the crucible to the violent heat of a blast-furnace for a quarter of an hour. On breaking the crucible, we find in the hollow of the luting a concretion bristling with brilliant points; this consists of sulphuret of potassium imbedding the crystals of alumina. With nitromuriatic acid diluted with water, a precipitate resembling fine sand is obtained; this is washed with several waters.

This process does not allow of the production of coloured stones, on account of the reducing power of the carbon, which converts all the colouring oxides into metallic globules.

The crystals are larger in proportion to the size of the masses operated on, and consequently to the duration of the calcination; those which I obtained with my little blast-furnace attain a size of 1 millim. and a thickness of $\frac{1}{3}$ millim.

Their hardness is excessive, for M. Grindreaux, our clever lapidary, has assured me that he found them harder than the native rubies, which he employed for the holes in watch-work. It took him twenty minutes to pierce one of them with a drill of $\frac{1}{10}$th millim. in diameter, making 100 turns in a second, so that it required 120,000 turns of the drill to pierce the sapphire.

The limpidity of these crystals is extreme; with a microscope of Oberhäuser and Hartnack and a power of 300 diameters, the bases of the rhombohedra exhibit equilateral triangles formed by lines of exquisite purity.

According to my researches, it is the sulphuret of potassium that becomes a solvent of alumina, for the same crystals are obtained by placing calcined alumina in the luted crucible, with some sulphuret of potassium. Consequently, the sulphurets, the fluorides, the cyanides, and, in a word, the binary compounds, presenting considerable resistance to decomposition and volatilization, may furnish us with the means of obtaining a great number of insoluble crystals. We may perhaps even succeed, with fires fed with oxygen, in finding a solvent for carbon, capable of furnishing the perfect diamond. And this is so true, that in trying to produce silica by these means, I have already obtained a smoky glass, free from aluminium and boron, which scratches the ruby. I obtained this singular body by placing in my luted crucible silicate of potash and sulphuret of potassium.—*Comptes Rendus*, April 6, 1857, p. 716, and *Chemical Gazette* for June, 1857.

FACTITIOUS IVORY FOR PHOTOGRAPHY.

BY J. E. MAYALL.

This invention, by the well known photographer of Regent Street, relates to the use of artificial ivory for receiving photographic pictures instead of glass or paper. This artificial material, which possesses all the properties and beautiful finish of ivory, and allows of any subsequent tinting of the image, and the obtainment of superior softness in the semi-tints, is what is known in France as Pinson's artificial ivory, consisting of a compound of gelatine and alumina. This material is prepared in the form of slabs, for the photographer's use, in this way:—The tablets or slabs are composed of gelatine or glue in its natural state, and are immersed in a bath of alumina, which is held in solution by sulphuric or acetic acid; by this means a complete combination takes place between the alumina and the gelatine or glue. The tablets or slabs should remain in the bath a sufficient time to become thick enough for the purpose for which they are required, and to allow the alumina to

entirely penetrate them and incorporate itself therewith; they are then removed and allowed to dry or harden, when they may be dressed and polished by any of the ordinary and well-known processes for polishing ivory.

Artificial ivory tablets, capable of bearing a fine polish, may also be made by mixing alumina directly with gelatine or glue; but this process is not so satisfactory as the process hereinbefore described, since the thickening produced by the admixture of the alumina with the gelatine renders the manufacture of the sheets both difficult and expensive.

Another composition of artificial ivory which is employed, consists of equal portions of bone or ivory dust, used either separately or combined, and albumen or gelatine, the whole being worked into a paste, and afterwards rolled out into sheets by suitable rolling or flattening mechanism. The sheets are then allowed to harden by exposure to the atmosphere, and are cut into slabs or tablets of the required size. But it is preferred to use two parts of fine powdered baryta, and one part of albumen, well worked together, and rolled out into slabs. The best plan hitherto discovered for working the materials together, is that commonly used in the manufacture of Parian marble; this composition may also be used spread upon paper, if desired. These slabs or tablets are then carefully scraped, to give them a perfectly even surface. They are then washed with alcohol, to remove any impurity therefrom, and are prepared in the ordinary manner to receive positive pictures. The pictures having been printed, the entire slab or tablet may be immersed for a few minutes in a weak solution of nitro-sulphuric acid or nitro-hydrochloric acid, for the purpose of rendering the picture more clear and brilliant. It is then fixed in the usual manner with hypo-sulphite of soda, and is washed, and then dried on a marble or other slab, or under pressure, to prevent it from warping.—*Lond. Prac. Mech. Journal*, Jan. 1857.

EAU DE VICHY—ARTIFICIAL VICHY WATER.

BY WILLIAM PROCTER, JUN.

The attention of the Medical Profession having been attracted to the artificial Vichy water, it is proper that a notice of the preparation should appear in our columns for the information of Pharmaceutists who may desire to make and vend this artificial water.

According to M. Longchamps, whose analysis was adopted by Soubeiran (*Traité de Pharm.*, 1847), the natural Vichy water from the Grande-Grille spring, the one most usually drank by visitors, is as follows:—

Carbonate of soda, crystallized	13.592 grammes.
Carbonate of lime	0.356 "
Carbonate of magnesia	0.085 "
Carbonate of iron	0.004 "
Sulphate of soda, crystallized	1.061 "
Water	1000.000 "

Reasoning on the probable play of affinities, M. Soubeiran constructed the following formula for preparing the water artificially (*Traité*, &c., page 726, tome ii.), in which bicarbonate of soda is substituted for the carbonate, and sulphate of magnesia for a part of the sulphate of soda and carbonate of magnesia, viz.:—

	Grammes.		Grains.
Take of Bicarbonate of soda	8.748	=	135.
Chloride of sodium	0.167	"	2.577
Chloride of calcium, crystallized	0.775	"	11.961
Sulphate of soda	0.740	"	11.421
Sulphate of magnesia	0.246	"	3.796
Tartrate of iron and potassa	0.009	"	0.138
Water	one litre, pints		2.113
Carbonic acid	five litres, vol.		305 cub. in.

He directs the salts of soda and the salt of iron to be dissolved in a part of the water, the sulphate of magnesia dissolved and added, and lastly the chloride of calcium in the remainder of the water, when the mixed solutions are charged with the carbonic acid gas under pressure.

The formula I have used is a slight modification of that of Soubeiran, the variation being made to get rid of small fractions, and instead of forcing gas into the solution, the salts are dissolved in the smallest possible quantity of water, put in the bottles, and then these filled with carbonic acid water.

For one dozen bottles of Vichy water.

Take of Bicarbonate of soda	13.5	drms.	(Troy.)
Chloride of sodium	15.4	grains	"
Chloride of calcium (fused and dry)	36.0	"	"
Sulphate of soda, crystallized	68.5	"	"
Sulphate of magnesia	22.7	"	"
Tartrate of iron and potassa	0.83	"	"
Water	two pints.		
Carbonic acid water	ten pints.		

Prepare twelve pint bottles with good corks. Dissolve the chloride of calcium in six fluid ounces of water and set it aside. Then dissolve the salts of soda and the salt of iron together in the remainder of the water, add the Epsom salts, and when dissolved, filter. Divide this solution equally among the twelve bottles, and then, having added half a fluid ounce of the solution of chloride of calcium to each, proceed to fill them with carbonic acid water (drawn quickly from the fountain), cork securely, and tie over.

On adding the chloride of calcium to the other solution a gelatinous precipitate of carbonate of lime is formed, which dissolves immediately through the agency of the carbonic acid water. It is better to add the chloride as you proceed than to mix all at once, as the solution of the precipitate is rapid in proportion to its gelatinous condition.

For a Fountain of Twelve Gallons.

When made on a large scale, the following recipe may be employed to make a twelve gallon fountain:—

Take of Bicarbonate of soda	13½	ounces	(Troy.)
Chloride of sodium	123.2	grains	"
Chloride of calcium (fused and dry)	288.0	"	"
Sulphate of soda, crystallized	548.0	"	"
Sulphate of magnesia	181.6	"	"
Tartrate of iron and potassa	6.64	"	"
Water	twelve gallons.		

Dissolve the soda salts and the iron salt in a portion of the water, filter and pour it in the fountain, then add the Epsom salts previously dissolved, and lastly the chloride of calcium in the remainder of the water. The fountain is now to be charged as in making ordinary carbonic acid water, and is then finished, and may either be sold on draught, or bottled by the apparatus used in bottling mineral waters under pressure.

Since the formula of Soubeiran was published, several analyses of Vichy waters have been made, which have proved its composition to be more complex than the analyses of Longchamps states it to be. The best of these is that of M. Bouquet, read to the French Academy in August, 1854. He gives the composition of the water of the Grande-Grille spring as follows. The quantity of each ingredient *by weight* in a litre of 1000 grammes is as follows, viz.:—

Free carbonic acid	0.908	Sulphate of soda	0.291
Bicarbonate of soda	4.883	Phosphate of soda	0.130
Bicarbonate of potassa	0.352	Arseniate of soda	0.002
Bicarbonate of magnesia	0.303	Borate of soda	traces.
Bicarbonate of strontian	0.003	Chloride of sodium	0.534
Bicarbonate of lime	0.434	Silica	0.070
Bicarbonate of protoxide iron of	0.004	Bituminous matter	traces.
Bicarbonate of protoxide of manganese	traces.	Total	7.914

It is thus seen that natural Vichy water contains arsenic, phosphoric, boracic, and silicic acids, besides potassa, strontia, and manganese. More recently, M. Nickles (*Jour. de Pharm.* Juillet, 1857) has announced the presence of fluorine, whilst other Chemists have believed bromine and iodine were present. If desired, the more

important of these additional ingredients might be added, and thus approach the artificial water more nearly to that of the spring; but the disproportion between the other ingredients in the two formulæ renders such additions of doubtful propriety without entirely reconstructing that for the artificial water.—*American Journal of Pharmacy.*

NATURAL SUPPLY OF CARBURETTED HYDROGEN GAS.

In sinking a well at the premises of Mr. Stather of Crystal Street, Hull, the workmen having bored to a depth of about forty-five feet, passed through a bed of peat three feet in thickness, beneath which was gravel, flint, and remains of marine shell-fish. As the water now issued from the surface of the boring in a bubbling fountain, varying in height from one to six or seven feet and from that to ten feet, spurting out volumes of gravel and fine sand, the sinker, who had, in sinking other wells, previously seen something of the kind though on a smaller scale, being certain that this was occasioned, not by the force of water, but of gas of some kind, determined to try whether it was inflammable, a thing which he had never in his life attempted before, and to his surprise there arose a lurid flame two yards in height, issuing from a tube three inches in diameter, and through which tube the water continued to flow and boil over without at all diminishing the volume of flame, which ascended considerably higher than the garden wall, which is seven feet high. This escape of gas continued for several days. The gas was examined by Mr. Sollitt and others, and found to be light carburetted hydrogen in a great state of purity. Pipes were laid on and burners attached, by means of which Mr. Stather's engine-house was lighted. As the boring of the well was extended downwards, however, the supply of gas was cut off.

SIMPLE ELECTRIC MACHINE.

M. Thore united the ends of a strip of paper about eight inches in width, so as to make a continuous band of it, and stretched it on two wooden pulleys covered with silk, one of which was rapidly turned by a handle; the electricity was developed by pressing a warmed flat iron upon the paper as it passed over one of the pulleys. He describes the effect as remarkable.

There is nothing new in the observation of the electricity developed by paper, and many of our machinists have noticed how often the bands of their machinery became electrically charged. But the apparatus is simple and cheap, and capable of working under atmospheric conditions which arrest the action of our ordinary machines. —*Academy of Sciences, Paris, May,* 1856, *and Journal of the Franklin Institute.*

RENDERING STUFFS WATERPROOF.

The following is the method patented by M. Menotti for rendering stuffs waterproof, and yet allowing them to remain permeable to air. We translate the French measures, assuming the litre as a quart, and the kilogramme as two and a quarter pounds avoirdupois:—

Take two vessels of a capacity of five gallons each; place in one 22 lbs. of commercial sulphate of alumina in fine powder; in the other, 9 lbs. oleic acid and $1\frac{1}{2}$ gallons alcohol. Stir this mixture well, and pour it into the first vessel, taking care to stir well with a wooden ladle during the mixture, and for ten minutes afterwards. Let the mixture stand for 24 hours, then decant the oleic acid and alcohol which are floating on top. Throw the precipitate upon a felt filter, and press until all the liquid is run out. Take the precipitate from the filter and dry at 86°; when dried, powder it by rolling it upon a table with a wooden roller. This compound the author calls *hydrofugine.* To use this, dissolve it in 150 times its weight of warm water for woollen stuffs, while for linen, cotton, or silk, 100 times the weight will be enough. Filter the solution through linen, and plunge the stuffs to be waterproofed into it; soak them well, then take them out and wring them; soak them a second time, then take them out and dry them either in the air or before a fire. The stuffs will be found, when well dried, impermeable to water, but not to air. The quantity of hydrofugine necessary cannot be accurately determined, but generally 1 oz. is enough for two yards of cloth or four of muslin.

M. Thieux, of Marseilles, proposes a similar process. In two vessels, each of a content of 12 gallons of river water, are dissolved, in the one 3½ lbs. of alum, in the other the same weight of sugar of lead. When the solutions are complete, pour the liquids together, by which will be formed an insoluble sulphate of lead, and soluble acetates of alumina and potassa, mixed with a slight excess of alum. As soon as the liquid has become clear, it is drawn off, and the stuffs plunged into it; they must be strongly compressed while under the liquid to expel the air from their pores, and then suffered to soak for at least four hours, so as to ensure the perfect penetration of the liquid everywhere. When withdrawn they are lightly shaken, then dried, brushed, and pressed with a hot iron. It appears that various specimens of cloth experimented on by the committee absorbed from 11 to 17 per cent. of their weight of saline matters, and retained their original appearance, and their pliability at all temperatures. But after immersion in fresh water for 24 hours they lost all their additional weight. As to the efficacy in this process, there appears to be a very serious difference of opinion, the conclusions of the committee appointed to examine it, as reported by M. Jacquelan, are, that it is not new, nor as good as was announced; but it had been tried and approved for five years by the Lyons and Mediterranean Railroad Company; that the committee could not tell whether it was durable or not; its cost was about twenty cents for waterproofing a coat or pair of pantaloons. On the other hand, M. Balard, known to all as one of the most distinguished and careful Chemists of France, reports that the thinnest woollen cloths impregnated with it are totally impermeable to water after weeks of contact with it; that the water evaporates from them, and does not pass through; that cloths which had been soaked for 48 hours in fresh water were as impermeable afterwards as before; that clothes rendered waterproof in this way, and exposed on wicker frames to the rains of October, never allowed a drop of water to pass; that a cloak of cloth thus prepared, stretched over a willow frame, and exposed to the stream from a fire-engine, worked by six strong men, from a distance of 15 yards, allowed no water to pass, except where the stuff was in contact with the frame, and was compressed upon it by the violence of the jet, but the transpiration from the skin appears to destroy the impermeability, so that it is probably applicable only to exterior clothing; finally, that there is every probability that it is lasting, as appears from the certificates. M. Balard himself testifies that an overcoat, worn by him for five months, which had been beaten, and rubbed, and subjected to all the ordinary usage of overcoats, remained perfectly impermeable. Clothes prepared in this way are said to be softer to the touch, warmer, absorbing less moisture, drying more quickly, and therefore more durable.

It would appear, therefore, that this process, which is cheap and easily applicable, even after articles are made up, is well worth experimenting upon.—*Bull. Soc. Encour.*

CHEMICAL HISTORY OF COLCHICUM.

BY M. L. OBERLIN.

In 1820, in connexion with the chemical examination of many vegetables of the family Colchicaceæ, Messrs. Pelletier and Caventou represented that the active principle of colchicum was the same as that of other plants of this family, and that veratrine was contained in these plants.

In 1833, Messrs. Hess and Geiger pointed out the difference existing between the active principle of colchicum and that of white hellebore and sabadilla, giving at the same time the physical and chemical characters of the former alkaloid, which he named colchicine. I have renewed this investigation; but although I have carefully followed the process given for the extraction of the alkaloid, I have failed to obtain a crystallizable principle, notwithstanding that I have tried all the solvents with the view of facilitating crystallization. Two Chemists who, at my request, repeated the process, arrived at a similar result.

The following are the results of my experiments on the uncrystallizable product obtained by the process of Messrs. Hess and Geiger. The aqueous solution of colchicine, acidified with sulphuric or hydrochloric acid, acquires an intense yellow colour. When it is reduced to a certain state of concentration over the water-bath, water forms with it a yellowish white precipitate. This precipitate, well washed and deprived of colouring matter, is soluble in alcohol and in ether, and crystallizes readily. This product is obtained in greatest quantity by using hydrochloric acid

and allowing the reaction to take place spontaneously. After some weeks there will be found a number of tufts of acicular crystals. These, on being powdered, well washed, and recrystallized, yield a nearly white product. When sulphuric acid is used it is difficult to obtain colourless crystals, on account of the resinous and colouring matter which they retain.

This crystalline product is not a salt. It is neutral, and tests do not indicate a trace of the acid employed in its preparation. I call it *colchiceine*, for it differs from the colchicine of Hess and Geiger, which appears to be a complex body.

The following are the properties of colchiceine. It crystallizes very readily in pearly scales. It is insoluble in water, but communicates to it a slight bitterness, which is sensibly increased on raising it to the boiling temperature. At this temperature a notable quantity of it is dissolved, but this is deposited again on the cooling of the liquid. The solvents of colchiceine are alcohol, ether, methylic alcohol, and chloroform, which, on being added to it, acquire a very intense and persistent bitterness.

The alcoholic solution of colchiceine is coloured by the addition of bichloride of platinum, but it gives no precipitate. Pure and concentrated nitric acid dissolves colchiceine, acquiring a very intense yellow colour, which passes to a violet colour, then to a deep red, a light red, and finally returns to its original yellow colour.

Concentrated sulphuric acid forms a solution of a very intense yellow colour, which it retains even when diluted with water. A brown flocculent matter is deposited after some time. Hydrochloric acid forms a solution of a pale yellow colour. Acetic acid also dissolves it, but without change of colour.

Colchiceine is soluble in solution of ammonia, and crystallizes out on allowing the solution to evaporate in the air. It is soluble in caustic potash. Perchloride of iron forms a green colour with it. There is no change of colour with acetate or subacetate of lead, with nitrate of silver, bichloride of mercury, or infusion of nut galls.

Colchiceine appears to be capable of combining with baryta, for, on adding a saturated solution of hydrate of baryta to a solution of colchiceine in methylic alcohol, there is immediately formed a voluminous gelatinous precipitate, which is soluble in wood-spirit, and also in excess of baryta water.

Colchiceine is unalterable in the air. It has no action on red or blue litmus paper. Exposed in a tube to the heat of an oil-bath, it first softens, then at 155° Cent. it melts, and if the temperature be raised to about 200° Cent. it becomes coloured. Heated on platinum foil it melts, acquires a yellow colour, and burns, leaving a mere stain, which does not affect moistened test paper. Heated with caustic potash it disengages gas, which turns reddened litmus paper blue. Calcined with potassium, according to Lassaigne's process, a residue is obtained, which, treated with sulphate of iron and hydrochloric acid, yields a precipitate of Prussian blue. The last two reactions prove the presence of nitrogen.

I have submitted colchiceine to ultimate analysis, and have obtained the following results:

Mean of Experiments.		Calculation.
C = 62.669	.....	C = 62.83
H = 6.560	.....	H = 6.560
N = 4.298	.....	N = 4.298
O = 26.473	....	O = 26.473
100.000		100.000

—*Repertoire de Pharmacie.*

NOTE ON RED SULPHUR.

BY J. W. MALLET, PH.D.,
Professor of Chemistry in the University of Alabama.

In a paper by M. Ch. Sainte-Claire Deville, published in the *Annales de Chimie et de Physique* for May, 1856, in which the various modifications which sulphur undergoes when heated are considered, the author states that the *red* variety of sulphur can be produced only by subjecting the same mass of this substance *several times* alternately to heat and rapid cooling, the permanent red colouration being never obtained *by one tempering.*

Magnus speaks in the same way of this modification of sulphur in his memoir contained in the number of the same journal for June, 1856.

Having observed a few months ago the accidental production, by a single heating, of red sulphur, which retains its colour perfectly unchanged up to the present time, I will mention the circumstances under which it was obtained, and the properties which it appears to possess.

Some clean roll-sulphur was melted in a glass evaporating dish for the purpose of exhibiting to students the production of the plastic modification on pouring it while thick and viscid into cold water. A portion was so poured into water, and the remainder was heated up to a higher temperature, so as to show the renewed fluidity of the melted mass. Being forgotten for a few minutes over the lamp, the temperature of the sulphur rose so high that it took fire, and the lamp was then removed, and the flame extinguished by throwing a cloth over the dish.

On examining the sulphur an hour or two after, it was found solidified in a cake of distinctly prismatic crystalline structure, and of a brownish-red colour. It was broken up into pieces of a size to go into a bottle, and in the interior were observed some ittle cavities lined with stout prismatic crystals.

This sulphur, having been set aside for several months, presents just the same appearance now as when first prepared. Its colour is nearly chocolate-brown, verging on red, and its hardness is greater than that of common roll-sulphur. Refused at a gentle heat it forms a thin, very dark brown liquid, appearing almost black by reflected light. If left to cool slowly in the air this solidifies again to a crystalline mass like the original cake, but a little darker in colour. If a portion be poured while melted into cold water it forms drops of a deep red colour (like Pyrope) by transmitted light, and almost black by reflected light. These drops do not solidify at once but remain soft, so that on touching them with a wire under water they may be drawn out into threads. When perfectly solidified they have a vitreous lustre and the same very dark red colour as in the plastic state, resembling somewhat "glass of antimony." They gradually, in the course of two or three days, become in part opaque and of a light red-brown colour, this change being confined for the most part to the surface of the drops, of which the interior remains glassy as before, but in some cases extending in veins and striæ through the interior of a drop. The change from the glassy to the opaque state begins usually at distinct points, and spreads gradually over the surface.

A portion of the original cake was melted and poured into cold water ten or twelve times in succession, as in the process for preparing red sulphur of MM. Magnus and Sainte-Claire Deville, but after these numerous heatings and coolings it presented very nearly the same appearance as at first, whether it were examined after slow cooling in the air or rapid solidification in cold water; it was perhaps rather darker in colour than that which had been but once re-melted. It became also slowly opaque and light in colour on exposure to the air for two or three days.

Some fragments of the original cake, with prismatic crystals upon them, were treated with bi-sulphuret of carbon. This rapidly dissolved out ordinary sulphur, forming a pale yellow solution, which became brownish orange on heating with the insoluble residue. The solution, allowed to evaporate spontaneously in the air, left octahedral crystals of ordinary yellow sulphur, tinged in places by a very little red, and round the edges of the evaporating dish was an amorphous crust of red sulphur; the quantity of the latter being quite small in proportion to that of the yellow modification dissolved, as observed by Deville and Magnus.

The portion insoluble in bi-sulphuret of carbon was of a red-brown colour, and amorphous ; it retained in some cases the prismatic form of the crystals in which it had been enclosed, but fell to the bottom of the vessel, on shaking, as a flocculent amorphous powder. A little of this insoluble red sulphur was heated in platinum foil, and burned without any residue.

A fragment of the original cake, heated in a test tube up to the boiling point of sulphur, sublimed, and appeared after sublimation with its ordinary yellow colour ; the unsublimed part re-solidifying as it cooled with the same red-brown tint as before.

Comparing all these characters with those of the red sulphur obtained by MM. Magnus and Sainte-Claire Deville by *repeated* heatings and coolings, it seems certain that a considerable portion of the same allotropic modification had been produced by a *single* heating in the unintentional experiment mentioned in this note.—*American Journal of Science and Art.*

NOTES ON ALUM IN BREAD, AND ITS DETECTION.

BY EDWARD ASH HADOW,

Demonstrator of Chemistry in King's College, London.

THERE are two methods recommended in chemical works, with a view to the detection of alum in bread, to both of which there appear at first sight to be theoretical objections, rendering it difficult to understand how they could answer the purpose for which they were proposed. One method—that of Messrs. Robine and Parisot—depends on the extraction of the alum from the bread by digestion in cold water, and then testing the clear filtrate for sulphuric acid and alumina with chloride of barium and ammonia respectively. This method seems open to the objections that the detection of sulphuric acid would not prove much, since it might have been derived from the common salt employed in making the bread; and the non-precipitation of alumina would not make its absence certain, since it might be retained in solution by organic matters extracted from the bread. The second method—that recommended by Kuhlmann—consists in incinerating the bread, digesting the ash in nitric acid, and, after filtration, testing the filtrate for alumina with potash. Here, again, it seems questionable whether the alumina would be found capable of solution in nitric acid after the prolonged incineration of the bread.

With a view to settle these points, 20 grains of alum were given to a baker to be introduced into a 1lb. loaf of bread, which, being in the proportion of 80 grains to the quartern loaf, is probably above the average amount employed; the loaf thus prepared was broken up and macerated in successive portions of water for forty-eight hours. The expressed liquids mixed, became perfectly clear by filtration through coarse paper. The filtered liquid was very feebly acid to litmus paper, rendering it by long immersion purple rather than red. One portion tested with chloride of barium, the other with ammonia, gave moderate precipitates. The great bulk of the liquid was evaporated to dryness, and ignited to get rid of a quantity of gummy organic matter. The residue, which fused readily, owing to the common salt present, dissolved for the most part in water, and wholly on the addition of a little nitric acid. Potash (pure and free from alumina) gave on addition an abundant precipitate insoluble in excess, and the filtrate remained perfectly transparent on addition of excess of chloride of ammonium, proving thus the total absence of alumina. The inorganic matters extracted by water were further examined, and found, in addition to common salt and sulphate of potash, to contain alkaline phosphates existing in the fused ash, at first as pyrophosphates, together with phosphate of lime, and a large quantity of phosphate of magnesia, which fully accounts for the precipitate obtained by ammonia in infusion of bread.

The glutinous mass of the bread left undissolved by water, was then incinerated completely, when the ash was found to be wholly soluble in dilute nitric acid. Potash was then added in excess, and the whole was filtered on testing the solution with chloride of ammonium, alumina was found in abundance; the portion of the ash insoluble in potash was chiefly phosphate of iron and manganese with a little phosphate of lime. Thus, it appears, that on treating alumed bread with water, no alumina is extracted even when alum is present in so large a proportion, so far from it, that the aqueous infusion of this bread produced an immediate precipitate with a solution of alum, becoming abundant on gently warming the mixture, and rendering it impossible that alum should exist in the solution, so that this process of maceration in water only, is entirely fallacious, and any sample of bread thus examined will give a precipitate with ammonia; but this precipitate consists only of phosphate of lime and phosphate of magnesia and ammonia, the extraction of which by water only, appears somewhat remarkable, the acidity of the liquid being insufficient to account for their solution. The removal of these phosphates by water appears to be nearly complete, while the retention of alumina and phosphates of iron and manganese is no less entire.

The quantity of alkaline phosphates present in the ash, renders it highly probable that the alumina is retained as phosphate, which would sufficiently account for its ready solubility in nitric acid, after strong ignition; at any rate Kuhlmann's method of extraction by nitric acid from the ash answers perfectly, the only objection being the length of time required for complete incineration of the bread, to obviate which, it may, after charring in a capsule of platinum, be deflagrated with nitrate of potash, a

process which can be effected over a spirit lamp. On digesting the mass in water, the alumina is almost wholly found in solution in the carbonate of potash thus produced.

Nitrate of cobalt is of no use as a means of detecting alumina in the ash, since the phosphates present are capable of giving the same reactions with this reagent before the blowpipe.

Since alumina is thus obstinately retained by bread, it seemed probable that its mordant properties might serve for its summary detection. With this view, a proportion of pure bread was immersed, simultaneously with a piece known to contain alum, in a freshly prepared and dilute decoction of logwood, and set aside for some hours, when a distinct difference between the two pieces was perceptible both in intensity and in shade of colour, which was more evident on breaking the two pieces. The pure bread was simply stained superficially with the pale orange-red colour of the decoction, while the alumed piece had acquired a purple dye, which had penetrated to some depth. A baker, in whose bread alum had been detected, acknowledged the fact when accused of it, but stated that he *only* used 1oz. for a bushel of flour, or 1 oz. to about nineteen quartern loaves, which amounts to about 5.7 grains of alum per 1 lb of bread. Dr. Normandy also states that no effect is produced in improving the appearance of the bread, if the quantity of alum be reduced below 1 in 906 of flour, or below 1 oz. per bushel; hence this may be taken as the *minimum* probably in which this ingredient would be added. A loaf was therefore prepared with this proportion of alum, and was found to give a perfectly satisfactory reaction with the decoction of logwood, a piece of pure bread having been immersed at the same time by way of comparison.

Sulphate of zinc was on one occasion detected in bread by Professor Bloxam, when he was led to suspect it, from observing that the ash had a yellow colour while hot, which disappeared on cooling. It is probable that with bread of pure wheat-flour, this phenomenon would not be observed, in consequence of the transformation of the sulphate into phosphate of zinc, by the alkaline phosphates present, there being no excess of alkali present to prevent such a combination. On one or two occasions, however, I have observed a strongly alkaline reaction of the ash, due in all probability to the addition of potatoes; in such a case only would such a phenomenon probably be observed.

Having on one or two occasions detected small quantities of copper in brown bread, and finding it left in the bread after digestion of the latter in water, I wished to try whether sulphate of copper was in the same predicament as alum, and if so, whether ferrocyanide of potassium was capable of detecting its presence, as it is stated to do, by merely moistening the bread with its solution. A loaf was, therefore, prepared with the addition of this salt, in proportion of 10 grains to the lb.; it was macerated in successive portions of water, in which very little copper was found to be dissolved, yet the residue from which all soluble matters had been extracted acquired a decided reddish tint when treated with ferrocyanide of potassium, which was found to produce a more marked effect than ammonia or hydrosulphate of ammonia. Bread thus adulterated, becomes equally with alumed bread, strongly dyed by an infusion of logwood, so that this test, though alone incapable of distinguishing between the two, would at least indicate that something was wrong. In applying this test, the solution should be freshly prepared, and diluted considerably; the pieces of bread should likewise be allowed to float in the liquid for about twelve hours, the effect being more marked than when they are entirely immersed so as to exclude the air. It is possible that unfermented bread might occasionally give a fallacious indication, if the carbonate of soda used were not wholly neutralized by the hydrochloric acid, added for the purpose, by the baker; as, however, the alkali would pass into the solution, it seems probable that the latter would likewise be simultaneously affected, and the alkaline reaction of the bread would explain the phenomenon. The only unfermented bread thus examined became unmistakably dyed; the bread, however, had a feebly acid reaction, and was found to contain abundance of alum.

Before concluding, it may be well to remark, that it is difficult to judge of the quantity of alumina present, merely by observing its bulk and appearance on precipitation, since its appearance varies much with its mode of precipitation. It probably appears most abundant when precipitated from its solution in potash by careful neutralization of the latter with a diluted acid, or by the addition of chloride

of ammonium and gentle warming; if, however, the latter be boiled, or the precipitation be effected by addition of ammonia to its acid solution, the alumina is far more transparent, and in a hasty examination might even be overlooked, when present in small quantity. The decoction of logwood should also be made with water containing carbonate of lime, such as that ordinarily supplied in London; for with a decoction of logwood in distilled water the differences of colour are far less marked.—*Quarterly Journal of the Chemical Society.*

AMYLENE CONDEMNED AT THE ACADÉMIE DE MÉDECINE, PARIS.

M. Giraldès having recently sent a paper to the Academy, entitled, "Clinical Study of Amylene," MM. Robert, Larrey, and Jobert formed the committee to which it was referred. In the report read on the 18th inst., M. Jobert details various experiments and observations he has since made with this substance, both with and without apparatus; and he comes to the conclusion that amylene exerts an energetic and dangerous influence. The statement that has been made, that it is less active than chloroform, is only true when it is administered in the open air, and is explained, he says, by the rapidity of its evaporation. If only a sponge be employed, there are only produced, after a period varying from nine to nineteen minutes, muscular agitation and acceleration of pulse, effects that ensue in from five to seven minutes if the sponge be placed in a cone of pasteboard. If an apparatus be employed, however, amylene becomes a most energetic anæsthetic, the desired result occurring in two, and often in one minute. The effects of this agent are the increase of the number of the pulse by thirty or forty, the modification of the colour of the blood, and the perturbation of the nervous system, inducing insensibility, coma, and the abolition of the intellectual power. It is thus a toxical agent, acting simultaneously upon the vascular and nervous systems. M. Giraldès does not advance sufficient proof that amylene is less dangerous than chloroform; and even M. Robert's proposition of employing it in certain exceptional cases is not admissable, inasmuch as amylene possesses the inconveniences, without the advantages, of chloroform. Chloroform does not, like amylene, deprive the blood of its red colour; and while chloroform depresses and renders the pulse slower, amylene quickens it, producing congestion of organs. Amylene is of difficult administration, while chloroform is easily given. Chloroform has furnished to M. Jobert the same satisfactory results at all ages, and he believes that it is not more injurious in infancy than at a later period. He proposed that the conclusions of the author in favour of amylene should not be received; but as the communication is interesting in other points, the thanks of the Academy should be returned for it.

M. Velpeau proposed a further condemnation of amylene on the part of the Academy; for from the experiments even of the reporter, it was evident that amelyne is more difficult to manage, and more dangerous in its results. In the recent case of death from it, there were not the attenuating circumstances adduced for chloroform or ether, such as the want of skill or experience of the manipulator, since it was the inventor himself who directed the procedure. "I maintain that a substance which in so short a time, and in the hands of him who recommends it, is dangerous to such a point, ought not to be permitted to be employed; and I propose that the Academy formally reject it."

M. Larrey observed that he completely agreed with M. Velpeau, and he should have thought that M. Giraldès, after having being present at Dr. Snow's last accident, would have somewhat modified his ideas upon the subject.

M. Jobert added, that when amylene is administered on a sponge, anæsthesia sometimes cannot be produced for half or three-quarters of an hour. If Charrière's apparatus be employed, it is rapidly induced; but at the expense of serious accidents. It differs from chloroform, in that the insensibility it induces is instantaneous and not progressive. It produces an important modification of the blood.—*Moniteur des Hôp.*, No. 100.—*Medical Times and Gazette.*

ON THE EMPLOYMENT OF FERROCYANIDE OF POTASSIUM FOR THE REMOVAL OF RUST-SPOTS IN WHITE LINEN.

BY PROFESSOR RUNGE.

The employment of ferrocyanide of potassium may often help us out of great difficulties in the case of rust-spots in linen. These do not always consist of common hydrated oxide of iron, but also frequently of oleate of iron, which can only be removed with difficulty, and with the assistance of heat, by oxalic acid, or the binoxalate of potash; and often not at all by sulphuric or muriatic acid, for these acids can only be applied cold and very dilute, as otherwise the linen suffers. From the high price of oxalic acid, therefore, a cheap means is wanting, when a great quantity of such iron moulds is to be destroyed. A case of this kind once occurred to the author, in which sulphate of iron had been used instead of potash, by which 300 napkins and other table-linen all acquired a rusty yellow colour, which, on being washed with soap, instead of disappearing, became darker; the sulphate of iron being decomposed by the soap, and oleate of iron precipitated upon the fibres.

Immersion even for several days in water acidulated with sulphuric and muriatic acids produced no effect, because the oleate of iron was not decomposed. It was here that the ferrocyanide of potassium did such excellent service. It was added in comparatively small quantity to the water, acidulated with sulphuric acid, and the linen was then moved about in the fluid. The linen became blue. When all the yellow had disappeared, and a clear blue had made its appearance, the linen was rinsed and treated with solution of carbonate of potash. Here the blue colour again disappeared, and with it a great part of the yellow, which only remained in spots. These were then very easily got rid of by dilute sulphuric acid alone.

The explanation of this process is easy. By the formation of Prussian blue, the oleic acid is separated from the oxide of iron. The carbonate of potash then brought into action combines with the oleic acid, decomposes the Prussian blue, and at the same time also dissolves the greater part of the oxide of iron, so that almost all the iron-mould disappears from the stuff simultaneously with the Prussian blue. Caustic lye does not act in the same way; it certainly destroys the blue, but the rusty yellow remains, because it has not the same solvent action upon oxide of iron as carbonate of potash.—*Polyt. Centralbl.* and *Chemical Gazette.*

RESEARCHES ON SILICA.

BY COLONEL PHILIP YORKE, F.R.S.

This communication is principally devoted to an attempt to determine the formula of silica, and to the relation of some remarkable results obtained in this research. After giving some account of the grounds on which the three different formulas now in use among chemists (viz. SiO_3, SiO_2, and SiO) had been advocated, the author proceeds to state, that it appeared to him that the direct method which had been followed by Rose deserved the preference. This method consists in determining the quantity of carbonic acid which is displaced from excess of an alkaline carbonate in fusion, by a given weight of silica. The number 22 being the equivalent for carbonic acid on the hydrogen scale, the equivalent of silicic acid is obtained by the proportion $x = \frac{22 \times \text{weight of silica used.}}{\text{weight of carbonic acid expelled.}}$

Four experiments are detailed, made with carbonate of potash, which give as a mean result the number 30.7 for the equivalent of silica. This agrees with the formula SiO_2, and nearly with the previous results of H. Rose. Then follow seven experiments made in a like manner with carbonate of soda, which give as a mean result the number 21.3 as the equivalent of silic acid—a number agreeing nearly with half that represented by the formula SiO_3, or $\frac{45.2}{2}$

Some experiments are then related, which go to show that the increased loss resulting with carbonate of soda could not be caused by the action of heat alone.—The author had next recourse to carbonate of lithia, and obtained as the mean result of four experiments with this substance, agreeing well together, the number 14.99 — a number which accords very closely with the formula, SiO. These

different numbers, obtained with silica, led the author to inquire whether any other body acting as an acid produces similar results with the fused carbonates of potash and soda. With this view experiments were made with dry, sulphate of magnesia, as a substitute for sulphuric acid, with bi-borate of soda for boracic acid, with alumina and sesquioxide of iron. Of these bodies only boracic acid gave results similar to those obtained with silicic acid. The other substances all gave the equivalent numbers usually assigned to them, equally with the carbonates of potash and soda.

Directing his attention then to determine whether the equivalent of silicic acid could be found in other volatile acids than the carbonic, the author relates some experiments made with the hydrates of potash and soda, but he explains that there are circumstances which render it much more difficult to obtain accordant numbers with these bodies than with the carbonates.

Six experiments made with hydrate of potash gave as mean result the same number as that obtained with the carbonate, viz. 30.8. But with hydrate of soda the mean of three experiments gave the number 17.2 as the equivalent of silicic acid —a result approaching that previously obtained with carbonate of lithia.

A silicate of soda was formed by fusing together silica and carbonate of soda, in proportions indicated by the previous experiments—*i. e.* 23 silica to 54 carbonate of soda=31 soda. The fused mass was crystallized. It was dissolved in water, and the solution evaporated *in vacuo* yielded a crystallized salt, which contained about five per cent. of carbonate of soda; when this, calculated as the ordinary 10-hydrated salt, was subtracted, the silicate agreed nearly with the formula NaO, SiO_2+7HO. A crystallized salt of like composition was obtained when hydrated silica was dissolved in a solution of caustic soda, the silica and soda being in the same proportion, *i. e.* 31 : 23. In these experiments it appears, therefore, that in the process of solution and crystallization, a portion of soda is extruded. When exposed to a temperature of about 300° F., nearly all the water was driven off from these salts, less than one per cent. remaining.

The fused silicate of lithia in like manner, when treated with water, appeared to split up into different compounds.

After guarding himself from drawing any decided inference from the experiments recorded, the author concludes by observing that at present he can see no alternative but to admit of more than one equivalent for silicic acid (that is to say, of more than one acid), the value of which is determined by circumstances,—such as the presence of water and the nature of the base to which it is presented. The existence of such different silicic acids has been already suggested by chemists on different grounds, particularly by Ebelman and Laurent, and lately by M. Fremy.—*Proceedings of the Royal Society.*

ON THE METALS ASSOCIATED WITH PLATINUM.

BY MM. H. SAINTE-CLAIRE DEVILLE AND H. DEBRAY.

All the simple bodies of native platinum have a common physiognomy, and yet some of them possess intimate analogies with the most dissimilar bodies,—from osmium, which is a metalloid, to rhodium, a metal more noble than gold. Their common character is the marked tendency to revert to the metallic state under the most feeble influences,—the ready dissociation of the elements of their compounds.

Platinum.—Next to palladium it is the most fusible metal of the group. When once it has been fused, it becomes volatilized sensibly, and at the moment of solidification presents the phenomenon of spitting, which has not hitherto been observed except in silver. An oxide of platinum is therefore probably formed at a very high temperature, and destroyed when the metal cools. This theory of spitting is justified by an experiment made by exposing silver to a temperature far superior to that necessary for its evaporization. The silver becomes oxidized, smokes like a lead-bath, and when the vapours are rapidly condensed, they are found to consist of yellow oxide of silver, which forms a coating a little clearer than that of lead. The silver must be perfectly pure. Proust had previously remarked that silver became oxidized before the blowpipe.

To cause the spitting of platinum, a mass of 500 to 600 grms. of metal must be kept in fusion in lime for a long time, and the metallic bath must be suddenly uncovered. When it is allowed to cool slowly, the spitting does not take place.

The fusion of platinum in lime refines the metal very perfectly, and furnishes a metal as soft as pure copper. The metal is whiter than ordinary platinum, and it has lost all porosity. It nevertheless still retains the property of condensing gases at its surface and producing the phenomena of the flameless lamp; its density is 21.15.

Palladium.—The spitting of palladium is effected with even more facility than that of platinum. However, as the oxygen is only disengaged at the moment when the upper stratum of the metal solidifies, the ingot which has undergone this process is cavernous, although its surface may be perfectly regular. Palladium, which is nearly allied to silver, is perhaps more oxidizable than that metal; its surface is always tarnished by a slight coat of oxide. It volatilizes at a very high temperature, producing greenish vapours, which condense into a bistre-coloured powder, a mixture of metal and oxide. Like silver, it dissolves in hydriodic acid with evolution of hydrogen; like platinum and the metals of platinum in general (except, perhaps, ruthenium), palladium can produce the phenomena of the flameless lamp under certain conditions.

Osmium.—This substance, like arsenic, which it so much resembles, is infusible under the ordinary pressure. But at a very high temperature it is rapidly volatilized without oxidation and without leaving a residue, if it be pure.

The temperature at which osmium disappears is not lower than that at which platinum emits vapours. Osmic acid boils towards 212° F. This curious property has allowed the density of its vapour to be determined. The experiment, which was twice tried at temperatures of 475° and 547° F., gave two nearly identical numbers, namely, 8.89 and 8.87. From this the equivalent of osmic acid corresponds with 2 volumes of vapour. These numbers indicate besides that the equivalent of osmium must probably undergo a slight correction, which would render it equal to the equivalent of platinum. In this operation the quantity of osmium reduced is insensible. A remarkable peculiarity is observed at the moment when the balloon is opened over the mercury. In contact with osmic acid mercury acquires the property of moistening glass, and the balloon is silvered with singular perfection by the osmium reduced by the mercury, or by an amalgam. The acid employed was prepared by the process of Berzelius, that is to say, by roasting osmium in a current of oxygen, an operation which readily furnishes considerable quantities of pure acid.

Rhodium.—Rhodium fuses with more difficulty than platinum; the same fire which is capable of liquefying 300 grms. of platinum only fuses 40 to 50 grms. of rhodium in the same time. No indications of volatility were observed in this metal, but it became oxidized very superficially like palladium, and spits in the same way. The surface of the ingot is often bluish. When rhodium has been properly refined and freed from silicium and osmium by roasting in contact with lime, it has very remarkable physical properties. Less white and less brilliant than silver, it is equally ductile and malleable.

An alloy of platinum and rhodium, with 30 per cent. of the latter, fused more readily than rhodium. After being fused and refined, this alloy works well, and furnishes chemical vessels possessing the valuable property of being unattackable by nitromuriatic acid.

Iridium.—Iridium is the most refractory of all the metals of platinum; scarcely 10 grms. of iridium can be fused in the time necessary for the complete liquefaction of 100 to 150 grms. of platinum. After being fused and refined, iridium is still brittle, although it may be flattened a little under the hammer. It betrays no signs of volatility. It has the property of condensing gases at its surface, and is capable of serving for the experiment of the flameless lamp.

Ruthenium.—The authors have been unable to procure this metal in a sufficiently pure state. It appears that under the influence of high temperatures, and in contact with lime, ruthenium disappears, producing a crystalline scoria, and leaving a very refractory and very heavy ingot, the density of which is at least 17, which appears to contain much iridium. In a future communication the authors will describe their methods for the extraction of these metals in the dry way.—*Comptes Rendus* and *Chemical Gazette.*

TARAXACUM A SOURCE OF FALLACY IN TESTING FOR MORPHIA.

The following case is reported by Mr. Norris F. Davey, of Romford, in the *Medical Times and Gazette* of August 29th:—

Mrs. A. G., the wife of a respectable farmer residing at Dagenham, aged 21 years,

mother of three children, had suffered since the birth of her first child from functional disorder of the heart. Two or three months ago her youngest child (five weeks old) was found dead in bed by her side, since which time Mrs. G. had been poorly and depressed.

On Wednesday, the 22nd of July last, she went to Romford and consulted Dr. Tabrum, who is in the habit of prescribing at a chemist's on market-days; he ordered a mixture, of which one ounce was to be taken twice a-day, and twelve pills, of which one was to be taken every night at bedtime.

It appears that she took a pill that night, and on the following day (23rd) two doses of the mixture, and another pill at bedtime; she made a hearty supper of bread and butter and porter.

Early in the morning of the 24th her husband got up to see if his men had gone to work; and upon returning to bed, observing that she was breathing uneasily, he raised her up in his arms, asking her if she felt ill, when she sighed once or twice and quietly expired.

On the 27th an inquest was held by C. C. Lewis, Esq., at which, after evidence had been given to the foregoing effect, Dr. Manly, of Barking, deposed that he had attended the deceased for several years; that she had suffered from functional disturbance of the heart since her first confinement, but that he had not observed such a state of disease as would lead him to anticipate sudden death.

Thereupon the coroner directed that a *post-mortem* examination should be made, and adjourned the inquest to the 29th.

On the 27th, Dr. Manly, assisted by Mr. Bowers of Romford, made the examination, and, not finding any disease to account for death, sent the stomach and its contents to Dr. Letheby, in compliance with the directions of the coroner.

On the 29th, Dr. Manly deposed that he and Mr. Bowers had examined carefully all the organs (except the kidneys), and that they found nothing to account for death; the heart was empty and rather flabby, and the brain was soft, but not more so than might have been expected from the state of decomposition in which they found the whole body.

The inquest was again adjourned to the following day, when Dr. Letheby deposed that he had received the stomach and its contents from police-sergeant Stratford; that it was much decomposed, and contained a small quantity of reddish gruel-like matter. He had made a most careful chemical examination of this, and had found in it distinct traces of morphine: the quantity detected was about one-tenth of a grain, equal to one grain of opium. Such a quantity was insufficient to cause death, but did not represent the whole amount taken, as more must have been absorbed. In the absence of any other ascertained cause of death, he should conclude that the deceased died from the effects of morphine, or opium.

At this stage of the proceedings it seemed clear either that morphine had been taken intentionally by the deceased; that it had been administered by some one about her; or, that it was contained in the medicines. The coroner, therefore, adjourned the inquest to the 3rd of August, in order to give Dr. Letheby time to analyze the remainder of the medicine, and procured copies of the prescriptions from the chemist who dispensed them: they proved to be as follows:—

℞ Pil. galbani, comp. ʒiss., pil. hydrargyri, gr. vi. M.—Divide in pil. xii.

℞ Sp. æth. sulph. comp. ʒiss., extr. taraxaci, ʒiss., acid. nitr. dil. ʒi., aquæ camph. ℥viii.—M. ft. mist.

On the 3rd of August the jury met for the fourth time, when the coroner read a letter from Dr. Letheby, in which, after stating that he had just completed the examination of the medicines received from police-sergeant Stratford, he continued as follows:—

"I do not find any trace of morphine or opium in either of them, but I do find in the dark ethereal mixture contained in the six-sided bottle a peculiar resinoid body which exhibits several of the reactions of morphine, and this I am disposed to think is the matter which I found in the stomach. Having it in larger quantity I can easily distinguish it from morphine, but where it occurs as a trace only in the contents of the stomach it is possible that it was mistaken for that poison. I am glad to have made these examinations of the medicines, because the results will remove suspicions that might otherwise have attached to the case."

An open verdict was returned.

As this peculiar resinoid body must have been a constituent of the taraxacum, several very important questions arise respecting it.

1. Is it always present in taraxacum?
2. What were the tests rendered fallacious by it?
3. What are the best methods of discriminating between it and morphine?
4. If a constituent of taraxacum, is it also present in chicory and other plants of the group of Compositæ?

This last point appears to me to be very important; for chicory being so largely consumed as a substitute for coffee, it must be very frequently present in the stomachs of deceased persons, and might prove a serious source of confusion in testing for morphine. It would appear that a very small quantity of this peculiar resinoid is capable of giving the reactions to which Dr. Letheby alludes, for the deceased had taken only two doses of the mixture, *i. e.* about twenty-two grains of the extr. taraxaci, and those some time during the day, and as the chief part of the bread and butter and porter had disappeared from the stomach, although taken just before going to bed, it cannot be presumed that much of the taraxacum taken previously remained in it.

It must be regarded as a most fortunate circumstance in this case that the whole of the medicine was not taken by the deceased, for had not a portion remained for analysis it is clear that the suspicion of poisoning would have continued unshaken.

I trust that this brief notice will induce Dr. Letheby to communicate his observations upon this important substance, and that it will draw the attention of analysts to chicory and taraxacum, for it is absolutely necessary, in a forensic point of view, that their composition and properties should be immediately and thoroughly investigated.

With respect to the composition of taraxacum, Pereira mentions (*Materia Medica*, third edition, vol. ii., part ii., p. 1574) that C. Sprengel analyzed the leaves and stems, and found in 100 parts only 0.100 of wax, resin, and chlorophyll.

The milky juice of the root analyzed by John gave only traces of resin, sugar, and gum. Mr. Squire mentions no resin or resinoid in his analysis of the expressed juice.

Frickhinger makes no mention of resin in his comparative analyses of roots gathered in November, 1839, and April, 1840.

Chicory would appear, from the analyses given of it by John (Pereira, op. cit.) to contain no less than 3 per cent. of resin.

The extract of taraxacum in the medicine examined by Dr. Letheby was procured from Barron and Harvey, druggists, Giltspur-street; and Mr. M'Carthy, the Romford chemist, who dispensed the prescriptions, has still about a pound of it in stock.

I am, &c.,

Romford, August 20, 1857. Norris F. Davey.

ACTION OF TANNIN UPON SKIN.

The investigations which M. Payen laid before the Academy of Sciences (Paris), are only the prelude to an attempt to get at, if it be possible, the knowledge of the phenomena which are going on during the operation of tanning, and to establish a theory of this operation, still so obscure to the Chemist. In this first part he has endeavoured only to examine thoroughly, and show the generality of a fact, which he had observed several years ago. This fact is, that there exist in the skin two portions which present different properties when they have undergone the action of tannin. One of these is easily disaggregated, soluble in ammonia water; the other preserves its fibrous texture, and resists the action of the reagent, although frequently renewed. The saturation of the skin by the tannin takes place long before the time practically required for good tanning, and requires for the two parts much less tannin than gelatine. The compound formed with the tannin, by the less cohesive parts of the skin, when it has been dissolved in ammonia, is changed in dissolving; it undergoes, besides, a considerable loss of nitrogen during its evaporation to dryness. The effects of long-continued tanning causes the gradual solution of the less cohesive portions united with the tannin, and consequently a relative increase of the quantity of resisting fibrous material. The product, in this case, must therefore be both more pliable and more tenacious. The friable soluble portion which remains in the tanned leather is unstable; in dissolving it may withdraw considerable quantities of the azotized substance; and it is thus, perhaps, that the less cohesive part of the skin is removed during the long operation of the tanning.

These are, in substance, the remarks which result from the observations and analyses reported in detail by M. Payen. The author proposes to examine successively all the operations of tanning, and to study separately the effects produced by lime, soda, by ammonia, the formation of which is determined by the foregoing bases, by dilute sulphuric and lactic acids, &c.—*L'Institut.*

THE VOLUNTARY VERSUS THE COMPULSORY SYSTEM OF EDUCATION.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—There may be, and there is, doubtless, much done in Continental States to raise the Pharmaciens' status, by compulsory education and examination, and by something of a monopoly, in the sense of limiting their number. Still, it may be doubted whether such training and tutelage, with Government protection from competition, are successful in filling the ranks of the profession with men of energy, inquiry, and progress, equal to some who may be found in the ranks of our own Chemists.

They seem to me, notwithstanding all their teaching, to be *slow dispensers.* In a considerable shop, in a busy street of Paris, the Pharmacien, assisted by his two shopmen, appeared to be quite unacquainted with Aromatic Confection! Having a draught made up, I watched the manipulation, and, as three persons assisted thereat, I presume it to have been in their best manner. The tinctures, half a drachm each, were *weighed in rather clumsy scales.* This might be according to *rule*, but it struck me as being very *slow.* The scales would take nearly a scruple to turn them.

The first remark made by an assistant to me was: "There are a great many poisonings in England?" To which I replied, "That the English journals took care to give publicity to every case, and never hushed up our scandals, but made the most of them, very different to the French journals." The next remark made was, "Oh! anybody may open a chemist's shop in England." "Not quite so," I said; "and, more especially, it does not extend to anybody's wife, which it would seem to do here."

At some large country towns in France the wife, sister, mother, or some female relative of the proprietor may be seen all day in the shop, not only serving and book-keeping, but prescribing. How remarkable is the anomaly which demands a highly-educated man, and admits a woman, who has had no special education, to perform the same duties. In the principal street of Dieppe, a Pharmacien, of good business and many years' experience, was totally ignorant of what he should put into a prescription for Mist. Camphoræ. We shall not, however, better ourselves by criticizing our neighbours, nor is that my object. But what I would say is, that though behind in some particulars, we are not so in all. We are already a long way beyond weighing half drachms of tincture in large scales, and the presence of a female in any of our shops* in any capacity is almost unknown, and very properly so, for to have a wife or sister actively assisting in sales or dispensing, at once disposes of the question of examination.

In the mechanical part or machinery of the business we are, I believe, admitted to be before all Europe, and that is a good foundation. They all send to London for a well-made article, one that will do its duty and wear well.

It would be pleasant to us all if our neighbours had no real grounds for saying we poison so many persons here; and the only way to attain to this is, by perseverance in self-education, and efforts for mutual improvement. We are not in the habit of having much done for us; we combine, and ask no authorities to assist us; we simply ask them not to obstruct nor to distrust us too much. Abroad they have Government interference and protection: but have they anything filling the place of, or answering to, a voluntary Pharmaceutical Society?

The pride and boast of this country are, independent union, free co-operation, combination for good. Of these the Pharmaceutical Society is the expression as regards our business, and I hope and trust it will, eventually, land us at a point equal to those who now, perhaps justly, hold us cheap.

I am, Sir, yours truly,

1, *Craven Place, Paddington, September* 17, 1857. J. L. Moore.

* [There are some widows and wives practising Pharmacy in England.—Ed.]

SALE OF POISONOUS DRUGS.

FROM THE MEDICAL TIMES AND GAZETTE.

Allow me to call your attention to a subject connected with the sale of drugs, which it is very important to make known to the medical profession, and through them, by way of caution, to mothers. I allude to the practice of nurses administering narcotics secretly to infants, for the purpose of obtaining a "good night's rest" themselves.

This custom being more prevalent than is generally imagined, it is very important to include the sale of all opiates and alkaloids under the same restrictions as arsenic and similar active poisons; but the "Sale of Poisons Bill" having been delayed, a great length of time must necessarily intervene before any enactment can be made to take effect, and the more needful is it for all possible means to be used by individuals and by the united efforts of medical bodies to check the facilities and avert the dangers which at present are so open to ignorant and careless hands, and I may add, to designing heads, to make use of.

Numbers of infants die from the cause above alluded to. Sometimes the death is sudden; sometimes the little sufferer lingers on a miserable existence for months. In either case it is considered that the child "died from natural causes," from the simple fact that young children do so often die, and no one knows why, because no very deep inquiry is made on the subject.

If these things were investigated with a desire to arrive at the truth, it would frequently be found that the little sufferer, on the contrary, died from very unnatural causes. One of the most prolific of these causes of death is the secret administration of opiates by nurses; and I believe I am only expressing the feelings which every just and benevolent person must entertain, when I state most unhesitatingly my opinion that the nurse who administers such a deadly drug, and the chemist who supplies her with it knowingly for such a purpose, are both deserving of the highest penalty the law can inflict.

POISONING BY OIL OF VITRIOL.

A determined act of self-destruction was committed by a female named Jane Bromley, aged sixty-six years, lately residing at No. 2, Neate-street, Bethnal-green-road. It appears that the deceased was the wife of a weaver, and for some weeks past she lived on unhappy terms with her husband. The deceased retired to rest, and was subsequently discovered by a lodger, who heard loud groans issuing from her apartment. The room was forcibly entered, when the deceased was discovered lying upon the floor in a state of great suffering. A medical gentleman was called, who used the necessary means, but the deceased was found to have taken a small bottle of the oil of vitriol. She was conveyed to the London Hospital.—*Observer, Sept.* 27.

POISONING BY STRYCHNIA.

On Friday last, a girl, named Wilson, aged thirteen, a servant to Mr. Sampson, Tibself, committed suicide under the following circumstances. In the absence of Mr. and Mrs. Sampson on the Thursday previous, she had been guilty of improper conduct with a man, and this coming to the ears of Mr. Sampson on Friday, he charged her with it. She denied it; but, as it was clearly proved by her fellow-servant, Mr. Sampson told her he should send for her mother; and on Saturday morning, while washing one of the children, she was suddenly seized with twitchings and contraction of the muscles. Mr. Turner, of Alfreton, was sent for immediately, but she was dead before he arrived. From the state in which he found her, he saw at once that death had resulted from strychnia. When asked just before she died what she had taken, she pointed to the cupboard, and it was found she had taken a quantity of "Battle's Vermin Killer," which contains strychnia. An inquest was held on Monday before Mr. Busby. Verdict—"Temporary insanity."—*Observer, Sept.* 27.

ALLEGED POISONING BY LAUDANUM.

Marlborough Street.—Bridget Kavanagh was brought before Mr. Bingham for final examination charged with having murdered her infant child by administering to it wilfully a narcotic poison.

Jane Hart, widow, 32, Fitzroy Market, said, the prisoner lodged in the same room with her, and had a baby a few months old sleeping in the same bed. The baby was well up to Sunday, the 13th; then the prisoner gave it something, and it became poorly. She asked the prisoner what she had given the baby, and the prisoner replied, "Nothing but a little cold milk." She asked the prisoner why she did not give it the breast, to which the prisoner made a sullen reply. The next day she saw the prisoner give the baby something from a bottle which contained aniseed. The prisoner asked her if she could not get something from a doctor to "sleep a baby." She replied, she did not know. The prisoner went out, and returned with something in a bottle, and then poured part of the contents of the bottle down the throat of the baby, which struggled very much and attempted to vomit, but the prisoner put her hand over its mouth. She asked prisoner what she had been giving the baby. She replied, "Only cold milk." In about a minute prisoner said, "Look at the baby; I don't think it will live; its eyes seem fixed, and I'm sure it won't live long, for its nose seems pinched in." Prisoner went upstairs, and witness looked into a drawer, and found a bottle labelled "Laudanum." She called to the prisoner, and said, "The baby is dead." The prisoner came down and began a kind of howl. She told the prisoner she had poisoned the baby by giving it laudanum. The prisoner said, "What does that woman say?" She replied, "I say again you have poisoned the baby, and here is the bottle." The prisoner, after refusing, went with the baby to the hospital. Prisoner, on Sunday night, said she hoped the baby would be stiff before morning.

George Toothill, assistant to Mr. Carter, surgeon, 7, Upper Marylebone Street, said on Monday week the prisoner came to the shop and asked for a pennyworth of laudanum, and said she wanted it to make a woman sleep, and wanted to know how many drops she was to give. Witness told her, and then labelled the bottle "Laudanum."

William Mushett, assistant medical officer at the University College Hospital, said he saw the child, and knew it was suffering from narcotic poison. A bottle was shown to him, and prisoner told him she had bought a pennyworth of aniseed in Tottenham Court Road, which she had given to the baby an hour or two before. Witness had made a *post-mortem* examination, and found nothing sufficient to cause death. His opinion was that the child died from the effects of narcotic poison.

Police-constable Davis said the prisoner told him she had bought some aniseed at a public-house in Grafton Street.

The prisoner was fully committed.—*Times*, Sep. 23.

BOOKS RECEIVED.

A Few Friendly Words to Young Mothers. By One of the Maternity. *With some Remarks upon Monthly Nurses, and Nurses in General.* Dedicated by permission to Dr. Conquest. London: Wertheim and Macintosh, 24, Paternoster Row; T. Hatchard, 187, Piccadilly. The above being anonymous, we had no intention of noticing it, but for the following allusion to an important subject:

"I now recollect some circumstance attending the administering of medicine to an infant, which I looked upon at the time as mere accident; but I discovered afterwards that this woman could not read! She passed her deficiency off with great address,—always putting on her spectacles and seeming to try and decipher the direction on the bottles, then giving it up, saying she was '*so* near-sighted;' and she would ask any one who happened to be present to read the label for her: this answered till a fresh bottle arrived, and the same ceremony was again gone through. But one day two bottles stood side by side—alike colourless; one was a mixture, the other an eye lotion; and the entrance of some one to the room of quick observation was the happy means of staying the nurse's hand about to administer a dose of the latter to the infant internally. Another mistake she really accomplished, which caused great suffering for a time, but happily resulted in nothing serious: she applied

dill-seed water to the infant's eyes instead of rose water, both being in the same sort of bottle; and, though labelled distinctly, to one who could not read and would not ask, they were alike. She made the venture, and erred."

De L'Amidon du Marron d'Inde; *ou des Fécules Amylacées des Végétaux non Alimentaires aux Points de vue Economique, Chimique, Agricole et Technique.* Par MM. Ad. Thibierge et le Dr. Remilly, de Versailles. Deuxième Édition. Paris: Librairie Victor Masson, Place de L'Ecole de Médecine, 1857.

Report of the Surgical Staff of the Middlesex Hospital, to the Weekly Board and Governors, upon the Treatment of Cancerous Diseases in the Hospital, on the Plan introduced by Dr. Fell. Printed by Order of the Quarterly Court. London: John Churchill, New Burlington Street, 1857.

TO CORRESPONDENTS.

We have received a sample of Artificial Manure, made from Refuse Leather, patented by Mr. George Chisholm, of Willow Walk, Bermondsey.

This manure is described as containing all the requisite chemical properties that constitute a good manure. The patentee has named it Cuero Guano, from the Spanish, signifying Guano made from Leather. It is in fine powder, which admits of its being drilled in with the seed. Without a complete chemical examinaton we could give no opinion as to the value of this compound.

Patents for Coating Pills.—Mr. Whipple informs us that, "forty years ago an alcoholic solution of the resin of aloes was largely and successfully used for coating pills."

A. P. S. (Minories), *Adolescens* (Exeter).—*Dispensers to the Army.* For information on this subject, application should be made to Dr. A. Smith, Army Medical Department, Whitehall.

An Apprentice (Carlisle).—(1.) Silvering glass with quicksilver requires some nicety of manipulation. The coating of metal is an amalgam of tin and mercury, obtained by covering a sheet of tin foil with mercury and laying the glass on the surface with moderate pressure, so as to allow the excess of mercury to run off.—(2.) A hairdresser would be more competent to give the information.—(3.) *Boudet's Depilatory*, crystallized hydrosulphate of soda three parts, quicklime in powder ten parts, starch ten parts: mix.

Chemicus (Huntley).—(1.) No.—(2.) The label alluded to is not liable to stamp duty. See page 154 of our last number.

G. P. C. (Leominster).—We do not know the composition of the article referred to.

A Member (Preston).—*Patent Medicine Licence.* A separate licence is not required for a branch establishment, provided due notice be given to the authorities at Somerset House.

A Member (Exeter).—(1.) Probably excess of liquor potassæ would answer best.—(2.) Salt of lemon, or chloride of lime.

W. S. (Riccall).—Ainsworth's *Latin Dictionary.*

An Associate (Mile End).—See vol. i. page 178.

R. C. (Newton).—*Botanical Prize.*—(1.) A misprint; for "from August 1st, 1857, to August 1st, 1858, read from May 1st, 1857, to August 1st, 1858."—(2.) It is requisite that the candidate should be a *registered* apprentice at the time of competing for the prize.

M. P. S.—We doubt the policy of publishing the circumstance alluded to.

G. B. (Selby).—See vol. xv., p. 144.

Erratum.—Page 160, line 27, *for* from August 1st, 1857, *read* from May 1st, 1857.

Instructions from Members and Associates, respecting the transmission of the Journal, to the Secretary, 17, Bloomsbury Square, before the 20th of the month.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XVII.—No. V.—NOVEMBER 2nd, 1857.

THE STATISTICS OF POISONING.

The number of cases of poisoning reported in this Journal having given rise to remarks and comparisons between the propensity to poison in England and France respectively, we have counted the aggregate number from the commencement of 1851 to the present time, as follows:—

Accidental	23
Criminal	11
Suicidal	17
Total cases of poisoning reported in this Journal during six years	51

This does not include the entire cases referred to in statistical reports of hospitals or the Registrar-General's returns which we have occasionally noticed, but merely those individual cases to which our attention has been directed, the publication of which was thought likely to be useful, as furnishing examples or illustrations of the various liabilities, preventable or otherwise, to which the public are exposed, with a view to the adoption of such precautions as might appear likely to be most effectual. During the period referred to, we have not intentionally omitted to notice any case of importance furnished by the police reports or reports of inquests as they have occurred, and the number thus recorded in this Journal in six years amounts, as above stated, to 51, or about nine cases per annum. This comparatively small number of illustrations of poisoning has been interpreted as an indication of a great and alarming tendency to destruction by the agency of poison in this country, in comparison with other parts of Europe—an inference arising from the fact, that the scientific journals on the Continent have not the same motive or inducement to notice the subject, which is regulated by their respective Governments.

It has been our object to point out from time to time the defects which exist in our laws relating to poisons and the practice of pharmacy in general, and the nature of the precautions which experience has shown to be desirable. The continual allusion to the subject during a series of years has had the effect of directing public attention to it, and each successive case of poisoning having been made the vehicle for such comments as the circumstances suggested, the arguments adduced more than sixteen years ago have been supported and brought into prominence by the course of events. It is, however, remarkable, that, while the Pharmaceutical Society from the time of its commencement has been using every endeavour to awaken public interest and anxiety in reference to the defective state of the law on the subject, the Society is now accused of opposing and obstructing legislation, because its Members are not disposed to signify their approval of certain proposed regulations, which they consider to be chimerical and impracticable.

The mortality from poison, which formerly excited no attention, is now overrated, and is represented as being an evil of fearfully increasing magnitude—a modern innovation, threatening to spread like an epidemic, and demanding prompt and sweeping measures for its suppression. We do not deny the existence of the evil, to which we have for many years been industriously directing public attention; on the contrary, the same necessity for precautions which

existed twenty years ago exists at the present time. But a reference to such statistical evidence as we have at command, does not lead to the conclusion that the magnitude of the evil is increasing, nor do we find a just ground for the sudden change from utter indifference to the opposite extreme of morbid excitement and panic, incompatible with a calm and practical consideration of the subject.

On reference to the Registrar-General's return for 1856, under the general head of violent deaths in England in 1854, we find the following particulars:—

CAUSES OF DEATH.	ENGLAND.	
	MALES.	FEMALES.
Intemperance	224	94
Privation of Food	44	43
Want of Breast-milk	413	329
Neglect	17	16
Cold	80	27
Poison	244	154
Burns and Scalds	1360	1395
Hanging and Suffocation	908	441
Drowning	1999	529
Fractures and Contusions	4891	886
Wounds	487	109
Other Violence	323	174
Causes not specified	2914	2749

Turning to the reports for six previous years, namely, from 1848 to 1853 inclusive, we find the number of deaths from POISON stated to be as follows:—

	Males.	Females.	Total.
1848	308	261	569
1849	290	236	526
1850	304	249	553
1851	275	253	528
1852	253	300	553
1853	270	219	489
1854	244	154	398

Comparing the items of the above with the return for 1854, there is a considerable diminution, namely, from 569 in 1848 to 398 in 1854. It may also be observed that the cases of poisoning bear a very small proportion to some other items in the list,—namely, burns and scalds, hanging and suffocation, drowning, &c. Thedeaths from intemperance do not include, of course, a large number of deaths from disorders originating in intemperance, but coming under separate heads in the returns. There is no poison which directly or indirectly occasions so large an amount of mortality as alcohol. This, however, is not usually included in the list of poisons, being classed with articles of diet.

Mr. Wilson, of Birmingham, in a letter in the *Times*, dated August 26, 1856, states that the books of the General Hospital of Birmingham record 63 cases of poisoning in eight years, of which only 5 proved fatal, making an average of one death in every 12 cases.

Mr. Fewtrell (Feb., 1850) reports the number of cases in the London Hospital during the years 1846, 7, and 8, as 26, 27, and 27, of whom two died in 1846, two in 1847, and one in 1848, making an average of only one death in 18 cases.

Taking this view of the question, it would appear that the appliances of science afford a *locus penitentiæ* in cases of poisoning which rarely exists in the

more violent and mechanical modes of destruction; and there is reason to believe that many persons may have been saved from death by the adoption of poison in preference to shooting, hanging, or drowning. On the other hand, it must not be forgotten that the number of deaths from poison represents only a small proportion of the number of persons who have, either by accident or from suicidal motives, placed their lives in jeopardy; and that this number might be considerably diminished if suitable and efficient precautions were taken. The advantage to be derived from a record of each case, with the circumstances under which the accident or offence occurred, consists in the information thus afforded respecting the sources of danger and the most likely means of prevention.

The advancement of science and the increasing facility of detection may be considered the most effectual restraint on the criminal; and we may infer, from the diminution of the number of cases recorded in the returns, that this has already produced some effect. It is also an undoubted fact, that much more care is taken by Pharmaceutical Chemists generally, in reference to poisons, than was formerly considered necessary. No respectable Chemist would, under any circumstances, send out a tincture, or in fact any medicine whatever, without a label. Some years ago this rule was not so universally adopted, and separate labels with the word "Poison" or "For External Use" were not so generally used as they are at present. The discussions which have taken place on the subject have had in this respect a beneficial influence, and an accident similar to the one reported in our present number could scarcely have occurred in the establishment of any Chemist in the kingdom. In this instance the parties concerned were medical men, one of whom applied to the other verbally for a supply of tincture of henbane. The order was understood to be for tincture of aconite, which accordingly was furnished. If it had been properly labelled, no accident would have occurred; but it was supplied without a label to a medical man, who, not recognizing it either by the smell or appearance, administered a dose which, if the tincture had been prepared according to the Pharmacopœia, would have been sufficient to kill three persons. Although the first dose did not produce the desired sedative effect of henbane, neither this circumstance nor the absence of a label awakened suspicion, and a second dose was given, which revealed the truth.

It is computed that the number of persons in England who deal in drugs—including Apothecaries, Chemists, and general dealers, with their assistants and apprentices—amounts to upwards of 15,000. These persons are occupied from twelve to fifteen or sixteen hours a day in preparing, dispensing, and retailing medicines, in quantities from a pennyworth upwards, to all classes of persons, rich and poor, learned and ignorant. They are often weary with constant application, called up in the night, sometimes perplexed with difficult prescriptions or the confusion of the three Pharmacopœias, in the hurry of business on market-days or at other times of pressure, their minds distracted with the weight of responsibility—circumstances which might be pleaded in extenuation in case of an occasional oversight; yet in a population of 14,000,000, supplied with medicine by about 15,000 persons, the total number of deaths annually from poison does not amount to more than four or five hundred, and of these a very large proportion are cases of criminal intent or culpable negligence, for which the sufferers are themselves responsible. From these facts, and the evidence which continually comes before us, we consider the Pharmaceutists, as a body, by no means deserving of the sweeping censure implied in the proposed Poison Bill; and if we take into the account the number of accidents which they prevent, by rectifying occasional errors in prescriptions, and by the precautions they adopt in the sale of poisons or strong medicines in general, we think it will scarcely be denied that the panic which at present prevails is somewhat exaggerated.

SECRET REMEDIES AT HOSPITALS.

The Report of the Surgical Staff of the Middlesex Hospital, on the treatment of cancerous diseases, on the plan introduced by Dr. Fell, contains but little in addition to the facts stated in a previous number, except some details of the surgical treatment, which are not within our province.

Various comments have appeared in the medical journals on the questions whether secret remedies should be tried in any public hospital, and whether the mode in which the trials were conducted in the present instance was in accordance with professional usage and etiquette.

The authorities of the hospital have been roughly handled in the *Lancet*. A disagreement having existed between that journal and some of the surgical staff of the hospital, much favour was not to be expected; but reviewing the question on its merits, we have not been able to discover any grounds for censure. The Cancer Ward of the hospital originated in 1791 in the benevolence of Mr. Samuel Whitbread, who bequeathed a large sum for its endowment, since which time it has received considerable additions. One of the conditions imposed by the donors consists in the promotion of medical science and the relief of suffering, by affording facilities for trying any new or improved modes of treatment that may from time to time be suggested. In accordance with this stipulation, the Committee have on several occasions been in communication with persons professing to be in possession of new remedies for cancer. In some instances the parties have applied to the Committee for permission to try their mode of treatment in the hospital; and in the year 1817 a scandalous fraud was attempted by a Mr. Ashby, who was introduced to the Committee by the Hon. J. C. Villiers. The imposition consisted in the introduction of worms from the intestines of animals into the cancer, and the application of a plaster, by which they were confined on the spot. At the time of dressing the cancer the worms were extracted, and it was alleged by the impostor that these reptiles were the cause of the disease, the cure of which consisted in their removal. The fraud was detected immediately on the first experiment being tried, the worms having been seen by one of the medical staff before their introduction, in consequence of some oversight or clumsiness on the part of the quack. Mr. Bell (afterwards Sir Charles Bell), who was at that time a Surgeon at the hospital, presented a report, which fully exposed this nefarious transaction.

It is a condition in all cases, that parties whose remedies or treatment are tried at the hospital, shall previously satisfy the medical staff as to the nature and safety of such treatment, and undertake within a reasonable period to publish all the particulars. Mr. Ashby assented to these conditions in the hope, without doubt, that the clandestine introduction of the worms might not be detected.

In 1852, Dr. Pattison applied for permission to treat cases of cancer in the hospital, but as he declined to state the nature of the remedies employed by him, or to reveal them to the public when fairly tested, his proposals were declined.

The proposal to try Dr. Fell's remedies originated with the Committee of the hospital, who, having heard of the notoriety of his mode of treatment and its alleged success, directed a communication to be made to the doctor, informing him as to the conditions on which the trial would be permitted, and subject to those conditions, offering to place a number of patients under his care. Dr. Fell consented to the terms, and communicated to the medical staff confidentially his entire system of treatment, undertaking in the course of six months to publish the report, which he has now done in his work lately advertised.

Dr. Fell having thus complied with all the terms and conditions required, and having at first in confidence and afterwards in print made known all the details of his treatment, it is difficult to conceive what more or less the Com-

mittee could have done in the performance of their duty to satisfy the most rigid requirements of professional etiquette. Apart from the necessity imposed on them by the terms of the bequests by which the cancer ward is endowed, the legitimate and customary place for testing the value of new remedies is a public hospital. If the profession had been always bound by the "red tape" of the Pharmacopœias and Dispensatories, we might have been up to the present time compounding electuaries of slugs and snails, albumgræcum, and other much esteemed remedies used by our ancestors. It may be a question whether there be any novelty in the plan adopted by Dr. Fell, and when we separate that which is meretricious from the actual remedy by abandoning the puccoon, the value of which is not supported by evidence, and the cochineal with which his ointment is coloured, the substantial remedy left is the chloride of zinc, the use of which in cases of cancer is not new, and the only novelty consists in some minute details of surgical manipulation, which it does not come within our province to describe or discuss. It is the object of all researches in medicine and pharmacy to arrive at and establish the truth, and every investigation undertaken with this object, and resulting either in the exposure of a fallacy or in the introductions of a substantial improvement, is a step in the right direction.

PROCEEDINGS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

We have received a portion of the Report of the Annual Convention held at the Hall of the Philadelphia College of Pharmacy, Sept. 8th, 1857. In the absence of the President, Mr. G. W. Andrews, the chair was taken by Mr. F. Stearns, of Detroit, V. P. The subjects discussed at the meetings of the Association are analogous to those which occupy the attention of Pharmaceutists in this country, and the steps taken in reference to some questions originally emanating from our Society, afford evidence of the mutual advantage of correspondence among Pharmaceutical Associations in different countries. The following reports were read by their titles and laid on the table:—the Report on a Syllabus of a Course of Study appropriate to the Student in Pharmacy; the Report on Weights and Measures; the Report on the Sale of Poisons; the Report on the Progress of Pharmacy; the Report on the Expediency of the Association taking a part in the Revision of the Pharmacopœia.

The Committee appointed to collect, compile, and report local unofficinal formulæ in use by Physicians, presented a Report, which was received and laid on the table. Several of the Members appointed for the special consideration of various scientific subjects presented their reports, others requested an extension of time. The report before us not being complete, we can only give this brief notice of the meeting on the present occasion.

The Association not having met in Philadelphia since its original organization in 1852, the number of Members in that city was not so great as might have been expected from the local advantages and pharmaceutical importance of that city. At the recent meeting in September, a considerable number of new Members were elected. Philadelphia has always taken a prominent part in the advanncement of pharmaceutical knowledge and the elevation of the professional character of Apothecaries and Druggists throughout the United States.

TRANSACTIONS

OF

THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *October* 14*th*, 1857,
Present—Messrs. Bell, Bird, Brew, Davenport, Deane, J. B. Edwards, G. Edwards, Hanbury, Keeling, Macfarlan, Morson, Meggeson, the following were elected

MEMBERS.

BRADFORD .....Bell, Francis
CLAPTON .....Granger, Edwin John
LONDON .....Forrest, Richard

MAJOR EXAMINATION, *October* 20*th*.

Cortis, Edward Charles .....Worthing
Maries, Henry Davies .....Watford
Oliver, John Hamer.....Salop
Roberts, Peter .....Mold

MINOR EXAMINATION.

Davies, Richard .....Walworth
Ereaut, John.....Jersey

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	ADDRESS.
Allison, Richard Ridgill	Mr. Howorth	Doncaster
Baker, Thomas	Messrs. Grove & Son	Blandford
Haines, John Jenkins	Mr. Haines	Bromsgrove
Hasselby, Thomas John	Mr. Chantry	Goole
Highway, Matthew Henry	Mr. Caddick	Newcastle-under-Lyme
Jones, David Hodges	Mr. Brend	Swansea
Moore, Abraham	Mr. White	Birmingham
Prust, Richard	Mr. Brend	Swansea
Pistrucci, Filippo	Mr. King	London
Rowell, Joseph	Messrs. Sturton & Son	Peterborough
Robinson, James Frodsham	Mr. Hatton	Warrington
Warren, Thomas Peter Bruce	Mr. Pasmore	Exeter

PHARMACEUTICAL MEETING,

Wednesday, October 14*th*, 1857.

MR. JACOB BELL, PRESIDENT, IN THE CHAIR.

THE following Donations to the Library and Museum were announced:—

Journal of the Chemical Society, from the Society.
Journal of the Photographic Society, from the Society.
Journal of the Society of Arts, from the Society.
Journal of the Institute of Actuaries, from the Institute.
Chemical Atlas for Qualitative Analysis, by Dr. Normandy, and *Dictionary to ditto*, by the same Author, from the Publisher.
Culpepper's *English Physician*, published in 1656, from Mr. W. Bartlett.
Flowering stem of *Gentiana lutea*, from Prof. Bentley.
Chinese Insect-Wax, from near Ningpo, China, from Mr. Daniel Hanbury.
The wood, fruit, camphor, and oil of the *Dryobalanops camphora*, from Professor de Vriese, of Sumatra.
A purple dye, obtained by the oxidation of Aniline, and specimens of silk dyed with it, from Mr. W. H. Perkin.

The CHAIRMAN having expressed the satisfaction he felt in observing so numerous an attendance at that, the first meeting of the season, referred to the

Sale of Poisons Bill, and said the subject had not been lost sight of by the Council, who had appointed a Committee to take such steps as might be thought necessary when Parliament reassembled.

DISTRIBUTION OF PRIZES.

The Chairman said, the first business for the Meeting was the distribution of the Prizes awarded to Students in the classes of Chemistry and Pharmacy, and Materia Medica and Botany. The Professors would report the results of the Examinations, and he would then have much pleasure in presenting the Prizes to the successful competitors.

CHEMISTRY AND PHARMACY.

Mr. Redwood said the competition in the class of Chemistry and Pharmacy had resulted in the award of the Prize Medal and two Certificates of Merit. The medal was awarded to Mr. Edward Charles Cortis, who was also the successful competitor for the prize in Materia Medica and Botany. Mr. Cortis had proved himself at the examination to be fully equal in his attainments to those who on previous occasions had gained the same distinction. Throughout the entire session he had been regular in his attendance and attentive to his studies.

The following were the questions for Examination :—

1. Describe the manufacture or production of carbonate of soda, nitrate of potash, sulphate of magnesia, and alum ; name the impurities most likely to occur in these substances, and explain how such impurities may be detected.
2. Describe the processes by which vinegar and alcohol are respectively produced from barley, giving a full explanation of all the changes which occur in the different stages of the process.
3. What is the change which occurs in the saponification of oil ? What are the principal processes adopted for the preparation of the solid fatty acids used in the manufacture of candles ? What are the supposed constitutions of bees'-wax and of spermaceti ?
4. Explain what is meant by *homologous series* of chemical compounds, and illustrate the explanation by examples.
5. Describe the Pharmacopœia process for the preparation of *Acidum Hydrocyanicum dilutum*, the methods of determining the strength and purity of this acid, and of detecting its presence in the contents of a stomach.

The prizes were awarded as follows :—

Edward Charles Cortis.....Medal
Thomas John Cutting .....First Certificate
Peter Cooke Jones.. .....Second "

BOTANY AND MATERIA MEDICA.

Mr. Bentley said that he had every reason to be satisfied with his class during the last session. The number attending was higher than any previous year, being about 80; and in regularity of attendance, general diligence, and proficiency, there was but little to be desired. With respect to the competition for the prizes, he believed that it was unparalleled, eleven candidates having presented themselves; of these, five had obtained honours. The two first gentlemen were equal in their viva voce examination, but the answers to the questions showed a superiority in Mr. Cortis, to whom the medal had been therefore awarded. He was sorry, however, that there was not another medal to give to Mr. Banner, who well deserved it, and he thought that it was a question worthy of the attention of the Council, whether two medals might not be advantageously awarded in such a case as the present, where the competition had been severe, and the merits of the competitors nearly equal. He entirely agreed with what had fallen from Mr. Redwood as to Mr. Cortis. This gentleman had well earned and richly deserved the honours that had been awarded to him.

Those candidates who had obtained certificates had also done their best to deserve them, and he felt quite sure that they were all gentlemen who would reflect credit upon their Professors and upon the Society.

The following were the questions for Examination:—

1. Describe the structure of the different kinds of Fibrous Cells; and mention in what parts of plants they are commonly found.
2. Describe the structure and mode of growth of the Monocotyledonous stem; and state the distinctive characters between the stems of Dicotyledonous, Monocotyledonous, and Acotyledonous plants.
3. Define a Root, Rhizome, Bulb, Tuber, and Corm; and state generally the distinctive characters between a Root and a Stem.
4. What is the botanical and geographical source of the officinal Camphor? Describe its characters both in a crude and refined state; and state how it may be distinguished from the Dryobalanops and artificial kinds of Camphor.
5. What is the botanical and geographical source of Scammony? Describe its characters when pure; and mention the substances commonly used to adulterate it, and the means by which such adulterations may be detected.
6. What are the characters of the Alexandrian and Tinnivelly kinds of Senna? Mention their botanical and geographical sources, the substances used to adulterate them, and the means by which such adulterations may be recognized.
7. Give the essential characters of the following Natural Orders: *Malvaceæ*, *Rutaceæ*, *Leguminosæ*, *Compositæ*, *Lobeliaceæ*, *Polygonaceæ*, *Iridaceæ*, and *Liliaceæ*.

VIVA VOCE EXAMINATION.

The following plants were submitted to the Candidates, who were required to name them, to state the natural order to which each belonged, to mention their medical and economical properties, and to describe any peculiarity they might present:—

Aconitum Napellus—Aconitum paniculatum—Sinapis alba—Sinapis nigra—Diplotaxis tenuifolia—Althæa officinalis—Malva sylvestris—Hypericum perforatum—Epilobium angustifolium—Fœniculum vulgare—Æthusa Cynapium—Coriandrum sativum—Crithmum maritimum—Scrophularia nodosa—Ecbalium officinarum—Symphytum officinale—Anchusa tinctoria—Gentiana Catesbæi—Hyoscyamus niger—Solanum Dulcamara—Solanum nigrum—Atropa belladonna—Hyssopus officinalis—Mentha viridis—Marrubium vulgare—Thymus Serpyllum—Origanum vulgare—Valeriana officinalis—Scorzonera hispanica—Tanacetum vulgare—Inula Helenium—Artemisia Absinthium—Dipsacus sylvestris—Rubia tinctorum—Lysimachia vulgaris—Aristolochia Clematitis—Mercurialis annua—Ricinus communis—Crinum spec.—Lilium spec.—Alströmeria aurea—Veratrum nigrum—Yucca spec.—Gladiolus spec.

The prizes were awarded as follows:—

Edward C. Cortis .....Medal
Samuel Banner .....First Certificate
Hugh Gill .....Second "
Thomas John Cutting .....Third "
Peter Cooke Jones.....Fourth

PRIZES FOR HERBARIA.*

The Chairman said he would take that opportunity of adverting to the prizes which had been offered by the Council for Herbaria collected and prepared by Associates, Registered Apprentices, or Students of the Society. The adjudication of the prizes had been referred to a Committee, who had awarded Medals and Certificates of Merit as follows:—

Thomas Fleetwood, Stratford-on-Avon ...Silver Medal
John Ereaut, Jersey .....Bronze Medal
William Henry Brown, North Shields.....First Certificate
R. B. Tollinton, Stowmarket.....Second "
James Green, Bath .....Third "

* In the last number the name of Mr. Squire was accidentally omitted in the Committee.—Ed.

The Chairman further stated that the distribution of these Prizes and Certificates would not take place until the next evening meeting of the Society. He would call on Mr. Bentley to describe the relative merits of the Herbaria which had been sent in.

Mr. Bentley said he had great pleasure in stating, that the members of the Committee were unanimous in the opinion that the Herbaria forwarded for competition far exceeded in merit what they had anticipated, and they cordially congratulated the competitors upon the great success which had attended their exertions. Having, in conjunction with Mr. Deane (the originator of the prize) drawn up the regulations to be observed by intending competitors, he must also say that the result was far beyond his expectations, and as the Council had now given notice of similar prizes to be contended for next year, he trusted that the favourable result on the present occasion would act as an additional stimulus to Pharmaceutical students, so that at the next competition the Herbaria would be even more satisfactory than those of the present year. Six herbaria had been forwarded this year for competition, and to five of these, Medals or Certificates of Merit had been awarded, for such was the great merit of the collections generally, that only one was unsuccessful in obtaining a reward. He hoped that the collector of this one would not be discouraged by his present failure, but that when he found how far he had been now distanced by his competitors, that he would go to work again in earnest, and send in another herbarium for competition next year, when he had little doubt he would obtain a much more satisfactory and honourable return for his labours. The six herbaria contained altogether more than 2200 plants, and as all these had to be examined separately, so as to authenticate their names as well as to judge of the manner in which they had been selected, dried, preserved, and arranged, the labours of the Committee had been by no means of a light nature, but it was at the same time a labour of love, because the result was so gratifying.

The first two collections were especially to be commended, that of Mr. Fleetwood containing upwards of 600 plants, and that of Mr. Ereaut 468, and as an area within the reach of students for botanizing purposes must be considered rich if it comprised over 800 plants, and the flora of Jersey he believed was under 700, in point of number of plants alone, these two herbaria must be considered as very satisfactory, but when it was also found that they contained a great many plants of difficult discrimination, and that such were with a few exceptions correctly named, and were, moreover, generally well selected, preserved, and arranged, he could scarcely speak too highly of them. The first medal had been awarded to Mr. Fleetwood, chiefly in consequence of the greater number of plants which his collection contained. With regard to the collectors of the three other herbaria, to whom Certificates of Merit had been awarded, Mr. Bentley said, that so meritorious did he consider even the third of these in order of merit, that he should, without hesitation, have regarded this as worthy of a silver medal had no herbaria been forwarded of greater merit.

Mr. Bentley then proceeded to offer some suggestions for future competitors. In the first place, he said, it was very important that collectors should be careful not to include in their herbaria any other plants but those indigenous to the United Kingdom, and even these must be collected in their proper habitats, and must not be derived from cultivated specimens of such plants. He called particular attention to this regulation, as one competitor on the present occasion had taken a great deal of trouble in preserving and arranging cultivated specimens of British plants, as well as numerous exotics of common occurrence in our gardens. The forwarding of such specimens increases the labours of the Committee without any advantage to the competitor, as all such are erased from their lists. The justice of such a proceeding is at once evident by taking such a case as the following:—Two students intend to compete for the prize, one of whom we will suppose lives in an obscure country town, the other in a large city, where

he is surrounded by gardens filled with the choicest flowers, and in which there may be a botanical garden. How easy it would be for the latter to gather a vast number of specimens for competition! and such a competitor might have but a limited knowledge of botany, and yet he would, surrounded by such facilities, almost as a matter of course, carry off the prize from his less favoured, although very probably much more painstaking and intelligent competitor. Besides the above objection to the collection of cultivated and exotic plants, several others might be mentioned, but the above case would, he thought, be sufficient for the purpose. The next point urged by Mr. Bentley was the importance of competitors paying particular attention to drying only good botanical specimens of the species intended for competition—that is, those only which presented well-marked, distinctive characters—otherwise they would be almost valueless to the collector; and in judging between nearly-allied species, unless such precautions were taken, it would be frequently almost impossible to distinguish with any certainty between them. He then made some remarks as to drying and preserving plants, and trusted that future competitors would be very careful in these respects. He then proceeded to remark that it was very desirable that the paper upon which the specimens were mounted should be of good substance, and in size not less than that of ordinary demy. His own specimens were mounted upon paper 17 in. by 10½, which was about the size generally used in botanical collections in this country. The specimen, having been mounted, should have its name, habitat, date of collection, and name of collector, written at the foot of the paper in the right hand corner; the species of a genus should then be collected and placed together in a sheet of paper, and the name of the genus written outside at the bottom in the left hand corner. The genera should be gathered together into natural orders, and placed in cases, with the name of the order placed in a conspicuous place on the outside; and lastly, the orders should be arranged in sub-classes and classes, according to the views of the author whose method had been adopted by the competitor. Attention to the above suggestions would render the herbaria far more valuable for future reference, and would materially assist the labours of future committees. In conclusion, Mr. Bentley observed that having now shown the success of the present competition, he congratulated the Members of the Society generally upon such a result, and he was delighted to find that botany was now becoming fully recognized as an important branch of the education of a Pharmaceutical Chemist. He said that Chemistry and Materia Medica, with their brilliant results and evident practical bearing, had too long monopolized their attention; there was no fear of these sciences being neglected, but with Botany the case was different, and it was long before its importance began to be recognized. He could not enter here into all the advantages to be derived from its study to the Pharmaceutical Chemist, he would only now urge its importance, first as an introduction to Materia Medica, which could not be properly understood without it; secondly, as training the mind to accurate observation and discrimination—qualities essential to every well-educated Pharmaceutist—and which especially commended it to the young student, and he was glad to find that at the present competition all the candidates were Registered Apprentices of the Society, because he felt sure that independently of the knowledge of plants they would have acquired, the advantage to them in other respects would be of the greatest value; and thirdly, he urged the study of Botany as a recreation to the young student as well as to the more advanced Pharmaceutist, because he believed that in its pursuit they would find a healthful recreation, and one that would afford them the purest pleasure, together with the most delightful associations. In conclusion, he hoped that at the next competition the Committee would have as satisfactory a report to make to the Society as on the present occasion.

The following papers were read:—

ON THE IMPURITY OF BROMIDE OF POTASSIUM.

BY A. B. GARROD, M.D.,

Professor of Materia Medica and Therapeutics at University College, London.

Bromide of potassium, on account of the encomiums passed upon it by the late Dr. T. Williams, was introduced into the London Pharmacopœia of 1836; it had been found useful by the above-mentioned physician, more especially in diseases of the spleen, in cases where this organ had become hypertrophied or enlarged. However, during the interval which elapsed between the publication of the Pharmacopœias of 1836 and 1851, its advocate passed from among us, the drug was not very extensively employed, and it was omitted from the College list of the Materia Medica. This, I think, is to be deplored, for either it had not adequate claims to be admitted in 1836, or sufficient time was not allowed for its remedial powers to be fully and properly investigated. Within the last few years it has been much more extensively employed, both in this country and in France, and for some lengthened period—certainly since 1851—I have given it rather largely, both in private and hospital practice. Bromide of potassium produces many peculiar physiological effects, and possesses therapeutic powers differing from those of iodide of potassium; at the same time it does not cause certain very unpleasant symptoms which so commonly occur during the administration of the iodide, and which not unfrequently prohibits its exhibition. I refer more especially to the affection of the mucous membranes of the nose, throat, &c. Bromide of potassium is usually given in much larger doses than the corresponding iodide, and it is therefore of considerable importance that it should be dispensed in a pure state, and especially that it should be free from admixture with other salts liable to produce powerful effects upon the animal economy.

Is it usually found in a pure state?

From my own experience, I fear not. During the present summer, when about to lecture on the bromide to the class at University College, I procured some of the urine from one of my patients in the hospital, who at that time was taking the drug in rather large doses, and proceeded to examine the fluid by means of starch and chlorine water: to my surprise, however, a very copious precipitate of the dark blue iodide of amidin took place, and no evidence of the presence of bromine was afforded. I was forced, therefore, to conclude either that iodide of potassium had been dispensed in lieu of the bromide, or that the bromine had been converted into iodine in its passage through the animal economy, a not very probable occurrence, or lastly that the bromide of potassium made use of contained a considerable amount of iodide. The last supposition was found to be the true one, for, on making an examination of the salt with the starch test, such was the intensity of the blue produced by the contained iodine that none of the orange-coloured bromide of amidin could be seen.

Since the time I first found iodine in bromide of potassium, I have made several qualitative examinations of different specimens of the salt procured from different sources. One sample in my possession since 1845 was found quite free from iodine. Another, obtained in 1850 from one of the largest drug establishments in town, was rich in that element; and I have specimens, probably recently prepared, some strongly contaminated, others without a trace of iodine. I believe, however, from what I have observed, that the presence of iodine in the bromide of potassium of commerce is by no means an unfrequent occurrence; and I think that many of my hearers, if they examined the specimens in their possession, would find my statement correct. Whether the contamination is intentional or not on the part of the manufacturers I have no means of ascertaining. At present, I believe, there is no object in making such addition

as far as price is concerned, but I am informed that the bromide containing iodine crystallizes in much larger crystals, and forms a better-looking article than when free from such admixture. My own examination of different specimens would lead me to think that such is the case.

As I consider the subject of the purity of bromide of potassium one of great importance, seeing that the drug will probably be extensively employed in medicine, I have been induced to bring it under the notice of the Pharmaceutical Society, knowing how much the Socicty has already done towards improving the state of Pharmacy in this country, and how anxious the members are to ensure the dispensing of pure drugs—a desideratum alike important to the Physician and Pharmacopolist.

IODIDE OF CADMIUM.

BY A. B. GARROD, M.D.

Within the last three years I have made a somewhat extensive trial of iodide of cadmium as an external remedial agent, and, as far as my experience goes, have reason to be fully satisfied with the results. I think also that it may prove an addition of some value to the list of our Materia Medica. I had previously felt the want of an agent containing iodine, and fitted for external application, those usually employed having many objections. The *free iodine*, or iodine combined with iodide of potassium, as occurs in unguentum iodinii compositum, Ph. L., is frequently too irritant in its nature, besides which, its disagreeable odour, and the staining of the cuticle which it produces, is often very objectionable.

The simple *iodide of potassium* ointment as ordinarily dispensed, is gritty in character, often to such an extent as to render its application to delicate skins impracticable, and it not unfrequently becomes brown from liberation of free iodine; now, although these inconveniences may be removed by proper management and care as to the purity of the drug, nevertheless I am disposed to look upon the salt when mixed with fatty substances as not very readily absorbed by the skin, and consequently not well adapted to produce the peculiar local effects of iodine, which it is often so advantageous to obtain; for it must be remembered that iodine is not always used simply for its rubefacient or counter-irritant action.

The ointment of *iodide of lead* likewise possesses certain objectionable qualities. Although not irritant to the skin, still it stains the cuticle yellow. And again, I consider the long-continued use of lead is undesirable; for we know that it is apt to induce many injurious effects when absorbed into the system, lead cachexia, colic, and different forms of paralysis, as wrist drop, &c.; these may occur even when very minute quantities are introduced, and such absorption might readily take place when the preparations are employed for any lengthened period around diseased joints, or over enlarged glands.

I believe, however, that *iodide of cadmium* possesses all the valuable qualities of iodine, iodide of potassium, or iodide of lead, when applied externally, and at the same time it is free from the various noxious properties of these preparations. The salt occurs in the form of mother-of-pearl-looking plates or six-sided tables, quite white and transparent, unaltered in the air, very readily soluble both in water and alcohol, consisting of equal equivalents of iodine and cadmium, or 69.46 per cent. of iodine and 30.54 per cent. of cadmium. It is readily distinguished by giving the blue colour with starch and chlorine, and the characteristic yellow precipitate with sulphuretted hydrogen. It forms a perfectly white and soft ointment, producing but little local action upon the skin, and appearing to be readily absorbed when properly applied with friction.

Under the use of an ointment of this salt, consisting of one part of the iodide to eight parts of lard, I have witnessed in many cases enlarged scrofulous glands, rapidly reduced to their normal dimensions, great relief likewise given

in various forms of nodes, and have also, in several instances, seen much advantage from its application to joints affected with chronic forms of inflammatory disease. It is extremely applicable in some forms of cutaneous disease, chilblains, &c. There is besides every reason to suppose that the absorption of cadmium into the system would not be attended with any injurious consequences, as it appears to be closely allied to zinc in its action upon the animal economy.

I believe that since I first made use of the iodide of cadmium as an external remedy, several physicians and surgeons have employed it, and I am inclined to introduce it with some confidence to the notice of the profession.

Dr. Edwards was glad to see medical men coming to the meetings of the Pharmaceutical Society, and giving them the result of their experience with reference to medicines, which it was the province of the Pharmaceutist to prepare and sell. He thought such communications must prove beneficial, and that they were fully appreciated by that Society. Substances were sometimes introduced into use as medicines, which, on being subsequently applied in the arts, underwent a considerable alteration in price, and a corresponding change in quality. Bromide of potassium, which was originally only used in medicine, was now largely used in photography, for which purpose the presence of a little iodide was not of any material importance. If, however, this impurity interfered with its effects as a medicine, it was only to have this pointed out, and he believed the defect would soon be remedied by manufacturers of the article. At the same time it must be recollected that iodine and bromine were closely associated in nature, and the entire separation of the former from the latter was not commonly effected. He could have wished that Dr. Garrod had quantitatively determined the iodine present in the bromide he had examined, as very minute quantities were rendered sensible by the test employed. He would also inquire whether, in the case of iodide of cadmium, the presence of a little zinc, with which the cadmium was very likely to be contaminated, would interfere with the efficacy of the remedy, and whether iodide of zinc, which would be much cheaper and more easily obtained, would answer the same purpose as iodide of cadmium.

Dr. Garrod said he did not think that the presence of a little zinc in the iodide of cadmium would interfere with the efficacy of the latter. The case was very different from that of bromide of potassium containing iodide. He thought the deliquescent property of iodide of zinc would render it less convenient for use than iodide of cadmium.

THE GLUCOMETER, FOR DETERMINING THE AMOUNT OF SUGAR IN DIABETIC URINE, OR OTHER SOLUTIONS CONTAINING GLUCOSE SUGAR.

BY A. B. GARROD, M.D.

The importance of determining the amount of sugar in different solutions, will be acknowledged by all; and to the medical practitioner in particular, it becomes deeply interesting, seeing that the presence in the urine of one form of sugar—namely, glucose, or grape sugar—is pathognomonic of a form of disease, which has been called diabetes, or sometimes saccharine diabetes, and by the French glucosuria. Many methods of discovering the amount of this substance have been from time to time proposed, but although by such means the analysis can be readily and accurately ascertained in the laboratory, yet for clinical purposes and for quick determination, I believe there is no very ready process.

The fermentation test, by means of a Fresenius bottle, where the loss of carbonic acid is estimated, demands the use of a balance, a considerable number

of hours, fresh yeast, &c. If the gas be measured by volume over mercury, many calculations are required for temperature and barometrical pressure, in addition to the length of time; and again, some amount of sugar may be present, without any indication being exhibited in these processes, arising from the absorption of the carbonic acid gas by the liquid.

The solutions of copper, known under the name of Barreswill's, Fromherz's, or Fehling's solutions, can be employed for quantitative as well as qualitative examinations of glucose sugar; but their use requires great care, time, and experience. The solutions also are apt to decompose by keeping.

The property which glucose sugar possesses of turning the plane of a beam of polarized light to the right, has also been made use of in estimating the quantity of sugar in urine and other fluids. This method, however, requires a rather expensive apparatus, the liquids operated upon must be very clear and colourless, or previous decolouration adopted; and again, unless the tube holding the fluid is of great length, the indications are not very readily appreciated, except by the practised eye. In the little apparatus invented by M. Soleil, manufactured by Dubosque, called the Diabetometre, where each degree of the vernier indicates nearly half a grain of sugar to the fluid ounce, it requires experience and care to obtain results that are within some grains—many eyes not being able to ascertain the equality of the tints of the two plates of quartz, within several degrees on each side of the zero point.

When engaged during the spring of the present year in the delivery of the Gulstonian Lectures on Diabetes at the Royal College of Physicians, I felt the want of a ready mode of determining the amount of sugar, the methods above alluded to occupying so much time as to render them practically of little value in clinical researches. After some reflection, and many trials, I was led to adopt the method which I will now explain.

The little instrument which I employ for the purpose is called the Glucometer, a name I think by no means inappropriate, considering that it indicates the variety of sugar (glucose) which is to be estimated. The name is, of course, derived from the Greek words signifying sweet and to measure. The principle upon which the instrument is constructed rests upon the fact that glucose sugar, when boiled with carbonate of potash, gives rise to an amber colour, the depth of which depends upon the amount of sugar present. In my early experiments I made use of liquor potassæ, but found that the indications thus obtained were not to be depended on; that, in fact, the tint was not always in proportion to the amount of sugar present in the solutions, but was liable to vary from many causes, such as the ratio between the sugar and potash and the duration of the boiling. When sugar is contained in fluids rich in some organic principles, urea, &c., as occurs in urine, these seem to possess some power of arresting the ulterior changes produced by excess of the alkali, probably by converting most of the caustic potash into a carbonate; and hence, in my first trials made on *urine* to which glucose had been added in certain definite proportions, the results obtained were tolerably correct; further experience, however, convinced me that the method could not be relied upon with any certainty.

I next made use of a solution of the carbonate of potash in lieu of liquor potassæ, and the following results will show the value to be placed upon its indications. A solution of glucose of a given strength was heated with an equal bulk of a strong solution of carbonate of potash; and it was found that after the fluid had been kept at the boiling point for four minutes no further change of colour ensued. Different quantities were subjected to the boiling temperature for times varying from one to ten minutes; the tints became gradually deeper up to four minutes, and then appeared to remain fixed, at least till more than twice that time had elapsed. Solutions of sugar of different strengths were next tried, the quantity per ounce varying from one grain to twenty; it was found that the tint was exactly in proportion to the amount of sugar present, or that after the operation, the fluids originally containing the large quantities,

when diluted to the proper extent, exhibited the same amount of colour as the weaker solutions. In all the experiments the carbonate of potash was in considerable excess. The ratio of the sugar to the carbonate of potash, when the latter is in excess, does not influence the resulting tint; such is not the case, as I have before stated, when caustic potash is employed.

I may mention here that bicarbonate of potash has no action upon glucose, and therefore the presence of any carbonate of potash in the bicarbonate may by this means be readily detected. This fact, I find, has been recently published, but in prosecuting these experiments many months since I had become aware of it; it applies equally well to the soda salts.

Upon this fact, then, of glucose giving with carbonate of potash a tint proportionate to the amount of the sugar in solution, the Glucometer is constructed. The apparatus consists of a standard tube, filled with a fluid possessing the same tint which half a grain of sugar, estimated as having the formula C_{12} H_{14} O_{14}, gives to the fluid ounce; a second graduated tube of the same calibre as the standard; and an accurately divided minim measure. I should mention that the coloured liquid in the standard is apt to become somewhat paler by exposure to light, and should therefore be kept in the dark when not in actual use. It is not, however, more susceptible to be altered by the solar rays than other coloured fluids, but, being of a pale tint, a small difference is perceptible, and its uniformity of colour is necessarily of much importance.

The following is the method of employing the Glucometer:—

1st. *Qualitative analysis.*—Put a little of the urine into a test tube, add about an equal quantity of liquor potassæ, Ph. Lond., heat over a spirit lamp, and allow the fluid to boil for half a minute. By this operation (Moore's test), we ascertain whether sugar be present, and by observing the amount of colour, have a guide to the subsequent dilution of the urine, which is often necessary before proceeding with the quantitative analysis, in order to prevent the graduated tube being of inconvenient length.

2. *Quantitative analysis.*—If the tint in the above experiment be not deeper than an amber red, no dilution will be required before it is examined; if of a dark red, the urine should have about its own bulk of water added to it; if of a reddish-brown, three times its bulk; if of a dark brown, seven times, &c. This dilution may be readily effected by means of the graduated tubes, employing about a drachm of the urine for the purpose. Having made the necessary dilution with distilled water,* accurately measure in the minim glass half a drachm (30 minims) of the urine, and add an equal amount of the solution of carbonate of potash.† Introduce these into a small flask or large test tube,‡ and wash out the measure with about a drachm and half of water. Heat to the boiling point, by means of a spirit lamp, and keep the liquid at that temperature for five minutes. If the contents of the flask be found to have a colour much above that of the standard, water may be added, and when somewhat cool, the whole transferred to the graduated tube, and dilution carefully made until the tint exactly accords with that of the standard. Care should be taken, on each addition of the water, to ensure a thorough admixture of the fluid in the tube.

All the required data for determining the amount of sugar are now obtained. Suppose a sample of urine, when treated with liquor potassæ, to give an orange red colour, and that it has afterwards been increased to four times its original bulk by the addition of three parts of water. Again, suppose that the half

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* A substitute for distilled water in the above analysis can be obtained by adding a few grains of carbonate of potash to ordinary water, and allowing the carbonate of lime to be deposited, then pouring off the clear fluid.

† The solution of carbonate of potash is thus prepared:—Dissolve four ounces of carbonate of potash in six fluid ounces of water. Filter, so as to produce a clear solution.

‡ A small German glass flask, of about an ounce and half capacity, is best suited for the experiment, which can be held over the spirit lamp by a small holder. If a test tube be employed, it should not be of less capacity than the flask.

drachm employed in the quantitative analysis, requires to be further diluted, so as to occupy six and a half drachms before the exact tint of the standard is obtained. Such urine would contain twenty-six grains of sugar per fluid ounce. For the first dilution increased the bulk fourfold, the second thirteen. Therefore four times thirteen, or fifty-two half-grains, or twenty-six grains of sugar are present. If a portion of the twenty-four hours' urine be made use of, and the total quantity measured, the daily elimination of sugar can be readily determined.

The method of ascertaining whether the tint of the liquid corresponds exactly with that of the standard, is to hold the tubes side by side, directing them to moderately bright light, such as that of a white cloud. Sometimes a thin piece of writing paper, placed behind the tubes, enables the identity of tint to be better observed. Lamp or gaslight is not well adapted for the experiment.

Should the urine contain but very little sugar, some slight alteration in the process may be made. One or two drachms may be heated with but a small quantity of the solution of carbonate of potash, and without the employment of more water than is sufficient to wash out the measure. When the amount of sugar is less than half a grain to the ounce, the Glucometer can only give approximate results.

If the urine contains much colouring matter, which seldom occurs in diabetes, the fluid may be completely decolourized by the addition of some animal charcoal (bone black) and subsequent filtration — an operation readily and speedily effected.

Lastly, should the liquid be found not perfectly transparent, it should be passed through a small paper filter before dilution to the standard tint, care being taken to wash the filter with a little water. When distilled water has been employed throughout the analysis, cloudiness is seldom observed.

It should be remembered that the correctness of the result depends on the accuracy of the measurements, and on the careful comparison with the standard. The Glucometer is manufactured by J. Coxeter, 23, Grafton Street East, W.C.

Mr. Redwood said the process just described by Dr. Garrod was, in all its details, with one exception, that which he had employed for several years past. The exception to which he referred consisted in the use of carbonate of potash instead of caustic potash. He did not admit the objection urged against the use of caustic potash, having used it in many hundreds of determinations of sugar, with results which convinced him that the process, when carefully conducted with the necessary precautions, was a trustworthy and accurate one. He thought the method suggested of detecting carbonate of potash or soda in the bicarbonates of those alkalies would be subject to fallacy, as the bicarbonates are converted into carbonates by boiling.

Dr. Garrod believed there was no published account of the process as he had described it. He considered the use of carbonate of potash instead of caustic potash important, as the colour produced by the latter was not always the same with the same quantities of sugar.

Mr. Mason said that some years ago, having occasion to determine the quantity of grape sugar in liquids, he had adopted a similar process to that described by Dr. Garrod, only using caustic potash instead of the carbonate.

USE OF METHYLATED SPIRIT IN MEDICINES.

Dr. Edwards, of Liverpool, laid on the table some samples of tinctures made with methylated spirit which had been put into his hands at Liverpool, and he wished to direct the attention of the Society to an illicit sale of methylated spirit for making such tinctures. He feared that the use of methylated spirit in the preparation of certain medicines was becoming more and more general, and he thought this practice ought to be inquired into, and some steps taken to determine whether, and in what cases, it ought to be allowed. There was no

time on that occasion for the discussion of this subject, but he hoped it would be brought forward at the next, or some future meeting.

Mr. Morson read a circular, issued by a party whose name he suppressed, to the following effect:—

"Having received the authority of the Board of Inland Revenue for the use of Methylated Spirits in the manufacture of Pharmaceutical Preparations, I beg to submit to your notice a list of Tinctures, Liniments, &c., equal in strength and efficacy to those made of Spirits of Wine, and about one-third the price. For all veterinary purposes these preparations can be used; and the great reduction in price, especially in Tinct. Opii and some other expensive tinctures, will largely increase the consumption.

"Lin. Camphor. Co.
—— Opii
—— Saponis
Sp. Camph. Opt.
———— Sec.
Tinct. Aconiti
——— Aloes
———— Co.
——— Ammoniæ Co.
——— Asafœtidæ

"Tinct. Belladonnæ
——— Benzoin. Co.
——— Camphoræ Co.
——— Capsici
——— Cantharidis
——— Catechu
——— Conii
——— Cubebæ
——— Digitalis
——— Ferri Sesquichlor.

"Tinct. Ferri. Ammon. Chlor.
——— Iodinii Co.
——— Lavand. Co.
——— Myrrhæ
———— Co.
——— Opii
——— Tolutani
——— Valerianæ
———— Co."

The Chairman said he should scarcely have recognized the tinctures by the smell, as the naphtha predominated so much. He should be very sorry to swallow tinctures made with such a menstruum. The use of methylated spirit for tinctures placed the honest Chemist in a disadvantageous position, as it was impossible for him to compete in price with those who adopted this practice.

Mr. Deane thought the Government were to blame for giving indirect encouragement to the use of methylated spirit in medicine. He had been informed that some of the medicines supplied from Apothecaries' Hall for the use of the army, were ordered to be made with methylated spirit.

Mr. Redwood confirmed the statement just made by Mr. Deane. He understood that some objection was at first urged at Apothecaries' Hall to the use of methylated spirit in the cases referred to, but the order was persisted in.*

PHYTOLOGICAL CLUB.

17, *Bloomsbury Square.*

The next Meeting of the Club will be held on Wednesday, November 11th, 1857, at half-past eight.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The Annual Meeting was held in the Royal Institution, on Thursday evening, September 24th, 1857.

The President, Mr. Abraham, on taking the Chair, said he had great pleasure in doing so, as he thought the Report that would be presented to the meeting would be satisfactory, and the proceedings of the past year generally gratifying to the Members. One of the most important subjects mentioned in the Report related to the Sale of Poisons Bill. The Bill was one which very materially affected the mode in which Chemists were to be required in future to carry on their business. It had not yet passed, but it was highly probable that a Bill more or less similar to it would pass before long, and they should endeavour to make it as perfect as possible. Members were generally aware, no doubt, that the Council of the Association sent a

* We are informed by Mr. Warington that the preparations referred to were intended only for external use.

deputation to give evidence before the House of Lords during the past session. The evidence they gave had been reported fully, and he thought it very desirable that Members should make themselves acquainted with it ; and he hoped they would find that the deputation represented them in a satisfactory manner. He would now call upon the Secretary, Mr. Mercer, to read the

REPORT.

Upon almost all former occasions, in presenting the Annual Report, your Council have been able to congratulate their fellow Members on the improved position of the Association, and its increasing growth in usefulness and strength ; and it is now their pleasing duty, at the close of the eighth session of the Society's proceedings, to present a Report still more favourable than any that have preceded it.

There are at present 128 Members, and 12 Associates in connexion with the Association, and your Council refer with great satisfaction to the considerable increase in the number of Members during the present session, 50 having been elected since the last Report. They would like to see a corresponding increase in the number of Associates, the proportion at present taking advantage of the facilities for education afforded by the Society, being very small, compared to the number within an easy distance of its operations ; for the Association now possesses within itself, with its extensive library, systematically arranged museum, pharmaceutical meetings, and course of laboratory instruction, every facility for giving a sound practical chemical and pharmaceutical education to the rising generation of Chemists and Druggists, which will fully qualify them for the satisfactory performance of their daily labours, raise the character of the profession to which they belong, and enable them with perseverance and industry creditably to pass the examinations of the Pharmaceutical Society, without the necessity of any lengthened stay in the metropolis.

The usual number of Pharmaceutical Meetings has been held during the session, and the supply of scientific communications, both of local and general interest, has been sufficient to attract not only the attention of the profession, but also of the general public. Indeed, your Council have had much satisfaction in observing the great interest the public take in the subjects brought forward and discussed at these meetings, and their appreciation of the purposes for which the Association was established ; and they would be glad to see the privilege of introducing friends, particularly medical men, more frequently taken advantage of by their fellow Members, as many of the subjects brought forward are of as much interest to the medical as they are to the pharmaceutical profession, and their talents and professional experience would materially contribute to the interest, and increase the value of the discussions which are continually, and often most unexpectedly, arising.

Your Council have received a very satisfactory report from the Librarian, Mr. T. D. Walker, of the condition and working of the Library during the past session. Since the last report, 63 volumes have been added, making the total number now in the Library, 230. The circulation has increased from 217 to 393 vols., and the amount received for fines is £2 2*s.* 6*d.* The expenditure in the purchase of books during the year has been very limited, in consequence of the heavy demands on the funds of the Society for the fitting up of the Museum, which has necessarily been attended with considerable expense ; but your Council propose, early in the next session, to make a considerable addition of valuable works to the Library.

In their last Report, your Council referred to the success which had attended their endeavours to establish a Museum of Materia Medica and Chemistry, and to the large number of specimens which had then been presented. These required classifying, and the Museum Committee have devoted a large amount of time and attention to this duty, on the efficient performance of which the usefulness of the Museum for educational purposes so materially depends.

The Museum was formally opened in December last, on which occasion your Council held a Conversazione, the rooms of the Royal Institution having been kindly placed at their service by the Committee.

This Conversazione was eminently successful, there being upwards of 400 visitors present ; and it gave your Council much pleasure to find that the Museum and the arrangements for the evening afforded general satisfaction.

There are still many specimens wanting to render the Museum complete, but even now it is, for the purpose of the student, a highly valuable collection, and though

still in its infancy, second only, as a Pharmaceutical Museum, to that of the Pharmaceutical Society in London.

The public mind having been much excited by recent cases of poisoning, marked by features of great atrocity, a strong wish has been expressed that the Legislature should do something to prevent such incidents, whether arising from crime or accident. Accordingly, the Government introduced a Bill into the House of Lords, "to restrict and regulate the sale of poisons." No portion of the public will rejoice more than your Council in the establishment of regulations calculated to attain the end proposed, but your Council were of opinion that whilst the Bill would interfere very much with your business, and with the interests of the public, it would not in any degree attain its object; and that, instead of regulating a certain class of sales—namely, those in small quantities to the poor—it would only transfer them to a less responsible and more numerous class of tradesmen. Your Council, in accordance with your direction, petitioned against the Bill, and deputed Messrs. Abraham, Edwards, and Mercer, to support their allegations before the Select Committee to whom it was referred. By the kindness of the Earl of Derby, the two former gentlemen obtained an audience of the Committee, by whom they were most attentively and courteously listened to, and their evidence is reported verbatim in the blue book, which has been presented with an amended Bill. Your Council are glad to say that the latter is much less objectionable than the original, and that the Committee, omitting many provisions which, besides being irksome, would have prevented its effectual working, have recognized the principle maintained by your Council, that "the Legislature can do nothing towards the attainment of the object unless the sale of the substances in question be confined to respectable and competent persons." The curtailment of the schedules of poisons, and the relaxation of some of the restrictions upon sales, render the Bill more practicable; but the provisions respecting angular bottles, a poison closet, and colouring, are embarrassing and of very doubtful utility.

The Committee have introduced provisions for establishing a Board, who are to examine all persons desirous of selling poisons, and give or withhold from them permission. Persons who have been in business one year are to be exempted for five years; after that they also are to prove their qualifications. The Board is to be constituted of three Government nominees, and of three other persons, deputed respectively by the Pharmaceutical Society, the College of Physicians, and the Society of Apothecaries.

Your Council regret that any other body than the Pharmaceutical Society should have been named for such a purpose, as they are already authorized by Act of Parliament to examine candidates in Pharmacy, and they are the only organization which has, in this country, done anything towards the improvement of the practice of Pharmacy. Moreover, the proposed constitution of the Board is a violation of the principle of self-government, hitherto universally adopted in the formation of the examining bodies of all other professions.

A copy of the Bill, and of the Report, with the evidence taken by the Lords' Committee, will be found in the Library. It is hoped that these will receive the attentive examination of the Members, and the further progress of the Bill will be carefully watched by your Council.

It is proper that the attention of Apprentices and Assistants should be emphatically called to the direction which legislation is taking. Educational qualifications are becoming more and more important, and even essential to the prosecution of their business.

Your Council have received from Dr. Edwards a very favourable report of the Laboratory Class, and are glad to find that several of the present pupils have belonged to former sessions, and have proved by their sustained industry and application that they have appreciated the instruction given, and taken a just view of their opportunities and responsibilities.

Of the students who have prosecuted their chemical studies in this laboratory, six of them have passed the examinations of the Pharmaceutical Society with credit, after devoting short periods to special preparation. Two more are now so engaged, and your Council trust that a succession of qualified candidates will be kept up; thus affording the highest encouragement to the Association to persevere in their disinterested labours for the benefit of young men. It has been the practice of Dr Edwards to vary the course of Lectures every session. The subjects hitherto

embraced have been—1. Chemical Philosophy; 2. The Metalloids; 3. The Metals and their Salts: and he purposes, during the coming session, to confine his remarks to the preparations of the London Pharmacopœia. These lectures will be delivered every Monday evening, at half-past seven; and your Council hope they will be attended by some who cannot make it convenient to enter for the full laboratory course.

The successful competitor for the President's Prize at the examination of the Laboratory Class this year was Mr. J. W. Taylor, apprentice with Messrs. M'Guffie and Co.

The Members of Council who retire from office this year are Messrs. Coupland, Edwards, Jones, and Wright, all of whom are eligible for re-election.

The Liverpool Chemists' Association in Account with R. Sumner, Treasurer.

Dr. SESSION 1856-57. Cr.

	£	s.	d.		£	s.	d.
To Printing, Stationery, and Books	13	8	2	By Balance in hand	7	18	6
" Fittings and Glass, Museum	22	4	2	" Library Fines	2	2	6
" Subscription to Cavendish Society (2 years)	2	2	0	" Arrears (5 Members)	2	10	0
" Coffee and Attendance	11	2	0	" Subscriptions from 128 Members	64	0	0
" Delivering Circulars, &c. (15 months)	13	0	0	" " " 12 Associates	3	0	0
" Rent	10	10	0	" Laboratory Fees	36	15	0
" Second Microscopic Prize	0	18	0				
" Sundry Expenses	2	13	9				
" Laboratory Fees (Dr. Edwards)	36	15	0				
" Balance in hand	3	2	11				
	£116	6	0		£116	6	0
				By cash in hand	£3	2	11

Examined and found correct, WM. GUY, THOS. LOWE, } *Auditors.*

Special Fund for defraying expenses incurred in opposing the Sale of Poisons Bill, in Account with the Secretary.

Dr. Cr.

	£	s.	d.		£	s.	d.
Engrossing Petition	0	7	6	Fifty-one Subscribers	12	15	0
Collecting Books and Postage	0	3	6				
Telegraphic Message	0	6	0				
Expense of Deputation	10	0	0				
Balance in hand	1	18	0				
	£12	15	0		£12	15	0
				By Balance	£1	18	0

Examined and found correct, WM. GUY, THOS. LOWE, } *Auditors.*

Moved by the PRESIDENT, and seconded by Mr. MACKINLAY, "That the Report and Statement of Accounts now read be adopted."

Moved by Mr. SUMNER, and seconded by Dr. EDWARDS, "That the List of Members, Laws, Bye-Laws, and Transactions of the Association, with the Catalogue of Books in the Library, be printed and circulated along with the Report."

The election of Members of Council, to fill up the vacancies caused by the retirement in rotation of Messrs. Coupland, Edwards, Jones, and Wright, was then proceeded with. The retiring Members were re-elected.

The CHAIRMAN said the pleasing duty now devolved upon him to present the President's Prize to the best laboratory pupil during the session, Mr. J. W. Taylor. The Prize consisted of two books—Fownes' *Chemistry*, and Christison *On Poisons*. He had been informed that Mr. Taylor had distinguished himself very much, and he hoped the exertions that had obtained for him that prize, would obtain for him all he could wish in his future progress through life.

Dr. EDWARDS endorsed the Chairman's remarks, and said it had given him great pleasure to award this prize to Mr. Taylor, who was certainly the most talented and successful pupil he had had in the laboratory class for some time.

Moved by Mr. R. R. JACKSON, seconded by Mr. FAIRBARN, "That the thanks of

the Association be presented to those gentlemen who have lectured or read papers at the Pharmaceutical Meetings, and also to the donors to the Library and Museum."

A vote of thanks having been passed to the Chairman, the meeting separated.

Royal Institution, Thursday, 8th October, 1857.

THE PRESIDENT, MR. H. SUGDEN EVANS, IN THE CHAIR.

Messrs. R. Bird, J. Blundell, F. Ayrton, and E. Clapham, were elected Members.

The SECRETARY announced donations to the Library and Museum from the President, Messrs. J. Bell, Clay and Abraham, Edwards and W. Laine, J. Glover, the Borough Engineer, and himself.

This being the first meeting of the session, the PRESIDENT then delivered the following Address:—

Gentlemen,—It has very properly, I think, become the custom for your new President to open the session by briefly reviewing the state of the Society, and of Pharmaceutical knowledge in general. On the present occasion this is, indeed, a pleasing duty: eight short years have rolled over us, all of which have been years of the most satisfactory development, but, of all the eight, the last has been signalized by the largest amount of success.

The past has been a year fraught with interests of the most vital importance, not only to our profession, but to the public at large, and the issues of which will most materially influence the position Pharmaceutists will henceforward occupy; they will limit or otherwise the confidence reposed in our knowledge and responsibility, by the public, and will raise us to the position we have so long laboured to attain, or place us on a level with licensed victuallers or pedlers. So much has latterly been said, and the importance of restricting the sale of poisons has been so frequently agitated, that public opinion and the Legislature seem alike determined to introduce some measure which shall put a stop to, or otherwise diminish, the use of noxious or poisonous drugs for criminal purposes, and guard the public against accidental poisoning. With this object in view, a Bill has been introduced, but so framed that, were it to pass into law, the immediate effect would be to remove from the honourable Pharmaceutist one-half of his business. It imposes upon the sale of any substance, her Majesty's Lords in Council may consider poison, a most vexatious and impractical amount of formality to the vendor and his customer, and, in default, the most iniquitous of penalties. The sale of such substances would virtually be transferred to a less scrupulous class of persons, who, having nothing to lose, would not hesitate to evade the law—a class of ignorant vendors, to whom the dangerous properties of the drugs in question would be an entire mystery, or matter of little regard, and from whom the intending assassin would experience but little difficulty in obtaining the implements of his villany.

Perceiving the evil tendency of this Bill, yet having the convenience of the public, and the honour of the Pharmaceutist in view, your Council devoted to the subject its most earnest deliberations, which resulted in a petition to the House of Lords, pointing out the inconveniences of the Bill, and offering to render every assistance in carrying out the objects desired; subsequently, at Lord Derby's suggestion, we sent up a deputation to give evidence before a Committee of their Lordships' honourable House, and the evidence those gentlemen gave, it cannot be doubted, exerted a due influence with the Committee, for, in the amended Bill recommended by the Committee, we find all those provisions they objected to, have been either expunged or very materially altered. Thus it is evident, that in conjunction with the Pharmaceutical Society, we have exerted a decided influence, the benefit of which will be extensively felt; and an influence that could not have been so rapidly brought into action by any other machinery than that presented by this Association.

The amended Bill which is now before the public, though materially altered, cannot be considered by any means perfect, and will, I hope, shortly become the topic of discussion at our ordinary meetings; in the mean time, however, I may here allude to some of its bearings. After providing for sundry formalities, and due precautions in wrapping, labelling, and putting into "*angular bottles*," it orders that all colourless poisons, except chloroform, shall be coloured, the solids with indigo, the liquids with archel; but in cases when "*the purchaser*" states that such colouring would render the substance unfit for the lawful purpose for which he says he requires it, the colouring may be dispensed with. Does it not seem that the whole

operation of the Act may be thus easily evaded, by the very simple process of a lie, on the part of an intending assassin? We may be sure that the seller, having strictly observed all the provisions of the Act, specially framed for the protection of the public, will take little further trouble in the matter. The after responsibility being removed from *his* shoulders to those of *the law*, he gladly resigns the unpleasant task of interrogating his customer as to the purposes the poison is required for. At present, this is, I believe, a custom almost universally followed by Pharmaceutists, without any protective law, for their own reputation; and many are the cases in the experience of most Chemists, of contemplated crime, which this simple interrogatory process has frustrated. But remove this personal responsibility, and few Druggists will consider the ultimate use of the poison any concern of theirs.

Again, very properly we find an exemption clause, including Physicians and Apothecaries, Veterinary Surgeons, and the sellers of patent medicines. Pharmaceutists are not included; yet they are considered competent to unite with Physicians and Apothecaries, in forming an examining board, for the granting of licences to sell poison; and therefore, I think, they ought to be exempted from the operation of this Bill, equally with Physicians. At any rate they have a far greater claim to exemption than the proprietors of patent medicines, under the stamp of which, a door is opened for the secret carrying on of as large a trade in poisons, as this Act is intended to suppress. For the present, however, the measure is in abeyance, and as *Punch* has it, "Lord Granville will not legislate about the sale of poisons until next session, and meantime will thank the poison-mongers and others to read his Bill, and favour him with their opinions." We must not neglect this advice. It is highly important for one and all of us maturely to consider the bearing of all the provisions of the Bill, that, by united efforts, we may accomplish the object desired, and raise the status of Pharmaceutical Chemists to the position it ought to occupy in this country.

Mr. Evans alluded at some length to the proposed Bill, in reference to the adulteration of food, &c., pointing out that one of the main objects of the Pharmaceutical Society, had been the discovery of better and easier methods of detecting adulterations, and that, in consequence, the sophistication of drugs was not practised to anything like the extent it formerly was. He considered, however, that with the public at large rested the responsibility of food, as well as other commodities, being so much adulterated. An inordinate desire for *cheapness* guided its choice, both in articles of diet and medicine; and so long as the public was content with the quality it obtained at the cheapest rate, it was not at all to be wondered at that competition furnished the compounds demanded. No police regulation, or excise precaution, could quench this rage for *cheapness*. The remedy was with the public, and a better educated dealer—the realization, in fact, of the very object this Association, and others like it, were originated for. In reference to this subject, it might be expected that he would speak of the valuable aid afforded by the microscope. He would but repeat what he had often previously expressed—that the time was not far distant when no Pharmaceutist would be able to afford to be without a microscope, and a thorough knowledge of its application.

In speaking of the great boon conferred upon manufacturing chemistry, by the admission of methylated spirit, Mr. Evans drew the attention of the meeting to the large amount of information respecting its properties, communicated during the past session, and the pharmaceutical preparations in which it could be used. But in reference to the use which he had recently learned that it was being put to, in the preparation of tinctures, he considered that, judging from the circumlocution of the process employed, the trade was illicit, and therefore would sooner or later receive the punishment the system so justly deserved from the hands of the Excise. In the mean time, however, it was an abuse of an important privilege, which demanded the most decided expression of the opinion of this Association. Such a use of methylated spirit was never contemplated, and every conscientious Chemist and Druggist would repudiate it, and do all in his power to discountenance what was, in fact, a system of adulteration.

While noticing the abundance of interesting matters that had been discussed at the ordinary meetings during the past session, Mr. Evans considered there was still room for improvement—that, with a profession the details of which are all fraught with interest, and food for inquiring minds, there ought to be but very seldom a call for aid from strangers. They had been less reliant than heretofore on extraneous

aid, but he thought if each member would devote a small amount of thought to some fact, however apparently trivial, and bring forward the results at the general meetings, a fund of useful and highly important information would be brought to light, which would entirely and profitably occupy the attention of the Society. The interest of the session had been greatly enhanced by the formal opening of the Society's Museum, which is second to none out of London, for the use of the Pharmaceutical student. There was still, however, room for additions, and an object so important to Pharmaceutical education, demanded the best attention and support of every well-wisher of the profession.

The munificent gift of Wm. Brown, Esq., to the intelligence of Liverpool, of a magnificent palace for the reception of a free Public Library and Museum, Mr. Evans considered would greatly influence the Pharmaceutists of Liverpool, and, by increasing general knowledge, demand from them increased information. He therefore, in conclusion, urged the young men, the apprentices of the profession, to mark the important and unmistakable signs of the times ; and now, ere the mind was occupied with cares and weightier matters, before they were surrounded by the anxieties and turmoil of actual life, ere the warfare with circumstances for existence began—now, while the mind was open to receive impressions for good—to make use of every opportunity that presented itself of gaining useful knowledge, and of planting those seeds which would spring up into the strongest and sharpest weapons in the conflict which awaited them. This Association offered to them every advantage for procuring a thoroughly practical knowledge of the science of Pharmacy : a first-class Museum, an excellent and increasing Library, fortnightly Meetings, at which matters of the greatest importance were freely discussed, and a practical Laboratory, presided over by a gentleman highly fitted for the task of training the expanding mind of youth. He then cautioned young men not to slight or neglect the opportunities thus brought to their very door ; and urged them not to suffer dissipation or frivolous amusements to usurp the place of solid improvement. The time was coming when the public would demand a guarantee of their scientific attainments; and from them, the rising generation of Pharmaceutists, would this demand be enforced. They must therefore be up and doing, if they wished to occupy that position in society they and their friends had anticipated, in the choice of this profession.

On the motion of Mr. Abraham, seconded by Dr. Edwards, a vote of thanks was passed to Mr. Evans for his excellent address.

A paper "On Dr. Medlock's Process for Purifying Water by means of Iron," was then read by G. Hamilton, Esq., F.C.S., Professor of Chemistry, Queen's College, Liverpool.

After detailing the reasons which had induced him to experiment on Dr. Medlock's process, he said it was not his intention to offer any opinion as to whether it was practicable or impracticable on a large scale, or whether the theory on which it was founded was right or wrong, his business at present being merely to state the result of his own experiments made on the Rivington water, with which the town of Liverpool is in the course of being supplied. He then proceeded as follows :—

Exp. 1.—On the 27th of June about a gallon of water, as supplied to the town, was drawn from the delivery pipe into a tall cylindrical glass jar. The water had a brownish-yellow colour, and contained *myriads* of animalcula. A spiral coil of clean iron wire was placed in the water near to the surface, and suffered to remain twenty-four hours. The wire was removed, and the water permitted to stand undisturbed for ten days.

Result.—The finely divided and diffused oxide of iron first formed, gradually aggregated into flakes and subsided, leaving the water perfectly clear and colourless, and free from any visible trace of animalcula.

Exp. 2.—A portion of the water was slowly passed through a filter, consisting of about sixteen folds of well-washed bibulous paper, and the filtered water tested with ferrocyanide of potassium, ferricyanide of potassium, sulphocyanide of potassium, and tincture of galls.

Result.—No indication of the presence of iron.

Exp. 3.—To a portion of the same filtered water added a few drops of pure dilute hydrochloric acid, and tested for iron as before.

Result.—Presence of iron proved.

Dr. Edwards kindly furnished me with a specimen of the real unmixed Pike water, which was much more deeply coloured than the previous specimen. I was thus enabled to make the following experiments :—

Exp. 4.—The water was treated as in Exp. 1.

Result.—The oxide of iron did not aggregate into flakes. There was only a very slight deposit formed of sesquioxide of iron, and the water remained turbid even after twenty days.

Exp. 5.—Filtered the water as in Exp. 2.

Result.—It passed through the filter perfectly clear and colourless. When the clear water was allowed to stand for a few days, it became slightly turbid, but again became clear and colourless by careful filtration.

Exp. 6.—Tested as before for iron.

Result.—Same as in Exp. 2 and 3.

Note on Exp. 5.—The President, Mr. Abraham, saw the filtered water, and declared that it was clear and colourless. Dr. Edwards saw it, and declared that it had a slight tinge of colour, visible at the surface, when viewed at a particular angle. I believe both gentlemen are right. The separation of the sesquioxide of iron, which takes place when the water is some time exposed to the air, will account for the fact that the same water which appeared to Mr. Abraham clear and colourless, afterwards appeared to Dr. Edwards to possess a slight tinge of colour.

Conclusions to be drawn from the previous Experiments.

1. Animalcula and organic colouring matter, such as those contained in the Pike water, may be removed from water, by means of clean iron wire and subsequent filtration.

2. A portion of iron remains in the filtered water, probably in the condition of soluble carbonate. A part of this, on exposure to the air, is converted into insoluble sesquioxide, which may be separated by filtering. The water then retains a mere trace of iron.

A short discussion ensued, after which the thanks of the meeting were accorded to Mr. Hamilton, and also to the donors to the Library and Museum.

ORIGINAL AND EXTRACTED ARTICLES.

A PARIS SKETCH.

About a year ago, several papers, republished from a French medical journal, appeared in Paris. They were called *Les Flèches Médicales*, and were written in that light, sketchy style so well known to readers of Parisian popular literature.

Most of them were strongly satirical, and met with so little favour from the Government, that they were finally suppressed. In England, or at all events in London, there is a constant monomania to depreciate our social position as Pharmaceutists, and to compare ourselves disadvantageously with our foreign brethren. The Pharmacien is supposed to be universally respected as a scientific and well-educated man, whilst the Pharmaceutist is always singing *De Profundis*, and longs for the arrival of that time when the world will recognize his claims. I have, therefore, thought it not altogether idle to throw into an English dress a pamphlet from the pen of a Dr. Joulin, describing, in no very flattering terms, the Chemist and Druggist. It is not for a moment to be supposed that this document expresses the general opinion of the profession, but it must represent the feelings of a certain class, and may at least furnish proof that, even on the other side of the Channel, all is not gold that glitters.

The tractate begins with a description, in parallel columns, of the unfortunate Chemist who is to be exposed, as compared with the *Pharmaceuticus honorabilis*, who is the type of excellence. The former is thus pictured :—Shop badly kept; bottles dirty, mended with strips of paper; laboratory small, science smaller; the master—with a strong aversion to a comb and brush, an admiration for Raspail, and a dominant instinct to amass money—is a bad citizen, and lives

generally in a back street. His honourable rival has a shop in exquisite order, a good laboratory, and plenty of apparatus; makes his own syrups, dispenses with faithful accuracy, keeps his poisons under lock and key, takes in scientific journals, combs his hair, and hates the name of Raspail. Now, had the comparison ended here, no one would have had a word to say; but the Doctor enlarges on the subject, and continues thus:—"When classified, the Chemist and Druggist appears to be only a simple variety of the genus Artifex. His duty in society should exclusively consist in mixing, triturating, pounding, and making into pills all that it suits us (the profession) to include in a prescription; and that properly, loyally, faithfully, promptly, without adding or subtracting anything, without permitting himself to make the least observation or reflection, which might cause a suspicion as to whether his pestle or spatula were directed by an intelligent being. Such was the ancient Apothecary, ignorant but faithful," &c.

"If, in that happy time, the golden age of Apothecaries, any member of that estimable corporation had allowed himself to invent on his own account, and without the express direction of his lord and master the Physician, any particular syrup, or even a simple purgative pill, the entire body would have arisen to expel him." Unhappy Doctor! the dreams of faithful ignorance have disappeared; he now turns to the doleful aspect of things as they are. "People who busy themselves with everything have taught the Pharmaceutist a little Latin and a little Botany; his head is turned—he is seized with the vertigo of ambition. He, who formerly kept himself modestly in the background, wishes to pass by others, in his turn: first, he ventures a few timid observations on prescriptions; then, he dares discuss them; last of all, he alters them." Surely this is the crisis: it seems not so, however. "Then," resumes the desponding philosopher, "he invents new remedies, endowed with marvellous properties; syrups which relieve consumption and hooping-cough in two hours, as well as a crowd of other maladies; pomades, and pills of such wondrous potency, that it is sufficient not to take them to be cured; lastly, every case is provided for, everything has its antidote—the slightest indisposition, as well as the most terrible affliction, finds its remedy in the shop, all ready tied, labelled, and packed up." The results are in consequence disastrous; the Physician orders one thing, the Chemist sends another; professional reputation is at stake, and the Druggist reaps his harvest. Then the public make matters worse, and say, "Truly, Medicine makes no advance—quite as many die now as used to die a century ago." Whereupon the Doctor sparkles into a witticism, and replies, "The wonder is, considering the number of Chemists and Druggists, that mortality is not on the increase—a race of beings who will not even sell mustard unadulterated!" (I omit the description of the Chemist, who holds an official standing in the National Guard—showing how his comrades who patronize his shop are at full liberty to be unwell and omit their duties, while pains and penalties await the delinquent who goes elsewhere to buy his physic.) Grave is the evil—where shall we look for safety? Despair seizes the irate Physician; he is satirical no longer, and becomes simply savage. The police must track the presumptuous offenders, who apparently have learnt Latin and Botany, and become associated brigands; a house-to-house inspection must be commenced forthwith; and, in the mean time, I commend the deplorable condition of our friends abroad to the consideration of the Pharmaceutical Society of Great Britain.

Nothing is more gratifying than to know by experience how totally untrue are such remarks; no satire ever bore so triumphantly its own refutation. Brightly in contrast stand the good-will and genuine friendship now existing between the Physician and the Chemist. There can be no real sympathy where there is no esteem; the moment the Pharmaceutist gave up his ignorance, the Profession ceased to fear him—the instant he became a rational, well-educated, and respectable individual, the same Profession shook him by the hand.

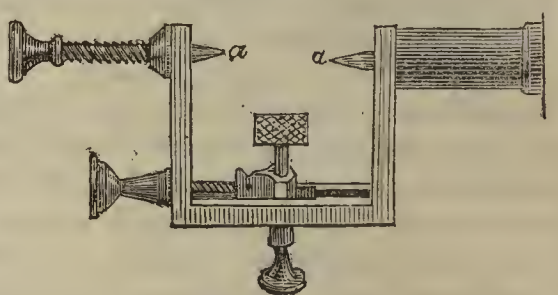
31, *Southampton Street, Covent Garden.* JOSEPH INCE.

REPORT OF THE RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION, AND OF THE APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

BY B. H. PAUL, Ph.D.

(*Continued from p.* 216.)

New Method of Measuring the Angles of Crystals.—It frequently happens that the faces of crystals, though even, do not give a sufficient reflection for the measurement of their angles in the ordinary way. For such cases Prof. Kobell* recommends the determination of the angle formed by two faces, by observing them successively in such positions that they appear as lines. For this purpose he employs the ordinary reflection goniometer, to which is attached a support (as shown in the figure), with which, by means of the two points *a a*, the edge of the crystal may be brought with tolerable accuracy parallel with the axis of the circle. The crystal is placed so that one of the faces to be observed is horizontal; then observed from a distance of a foot and a half, and turned round until it appears as a line. This operation is repeated for the second face by turning the crystal together with the circle as in ordinary measuring, while the eye is kept in the same place. The goniometer should be placed before a window, so that the greatest possible amount of light may be reflected from the face when turned towards the eye; it is then turned back until the reflection disappears. For the sake of seeing more easily, a lens of three or fourfold magnifying power may be used. These measurements may be made very easily; and Prof. Kobell states, that, by taking the mean of several observations, a result may be obtained as accurate as it is possible to obtain in any way with crystals whose faces do not reflect perfectly. The same method may be adopted for measuring the inclination of an edge to a face or diagonal, by placing the edge at right angles to the axis of the instrument, and adjusting the crystal so that the corner at which two edges, or an edge and a face, meet, is exactly in this axis. The crystal is then turned until the edges appear as a point.



Reaction of Mineral Sulphides with Hydrochloric Acid in the Presence of Metals.—Prof. Kobell† has observed, that when copper pyrites, moistened with hydrochloric acid, is touched with a zinc rod, sulphuretted hydrogen is immediately evolved, and the pyrites becomes brown. When the powdered mineral is mixed with finely-divided iron and covered with hydrochloric acid, diluted with an equal volume of water, the reaction is very marked. With two parts of iron the mineral is decomposed without the aid of heat and the copper separated. Some other sulphides present the same reaction, which may be taken advantage of for detecting the presence of sulphur, or for distinguishing certain sulphides. Thus realgar, orpiment, sulphide of molybdenum, and selenide of lead, do not give this reaction.

Estimation of Carbon in Pig Iron.—When powdered pyrolusite or manganite is mixed with finely-divided iron and hydrochloric acid an energetic action takes place; the minerals are dissolved completely within two minutes, and the temperature rises from 59° to 133° F. Only a slight evolution of gas takes place, the chlorine and carburetted hydrogen reacting upon each other so as to separate the carbon. Prof. Kobell‡ states that this reaction may serve for estimating the carbon in pig iron, for which purpose twice its weight of pyrolusite should be used, and hydrochloric acid, diluted with an equal volume of water, added gradually.

Test for Tellurium in Minerals, &c.—The ordinary blowpipe test for tellurium, in which a sublimate is obtained which melts to colourless drops of oxide of tellurium, is not always sufficiently delicate. Prof. Kobell,§ therefore, recommends heating the

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* *Gel. Anzeigen d. K. bayer. Akad. d. Wissen.*
† *Journal für Prakt. Chemie*, lxxi., 149.
‡ *Ibid.* § *Ibid.*, 151.

powdered substance with concentrated sulphuric acid. When the reaction first commences the acid becomes red, but when the heat is increased this colour disappears. On the addition of water to the red liquid, a blackish-grey precipitate of tellurium is produced, and the liquid becomes colourless. Nagyagite and blätterertz do not give the red colour, but a turbid brown liquid, which after standing some time appears hyacinth red, and gives the grey precipitate with water.

Constitution and Chemical Relations of Acetal, $C_{12}H_{14}O_4$.—When this substance is digested with concentrated hydrochloric acid, it dissolves, the mixture blackens in a few days, and then contains a considerable amount of hydrochloric ether. Perchloride of phosphorus reacts energetically with acetal, and abundance of hydrochloric ether is produced. When acetal is heated with hydrated acetic acid in a sealed tube more than an equivalent of acetic ether is produced. These reactions render it probable that acetal contains two ethyle molecules, and may be regarded as diethylglycol $\left(\begin{matrix}C_4H_4\\[C_4H_5]2\end{matrix}\right\}O_4\Big)$ or glycol $\left(\begin{matrix}C_4H_4\\H_2\end{matrix}\right\}O_4\Big)$ in which two atoms of hydrogen are replaced by two atoms of ethyle. If this were the case, these atoms of hydrogen might be replaced by other radicals.

By distilling a mixture of alcohol and wood spirit with oxide of manganese and sulphuric acid, M. Wurtz* has succeeded in obtaining two such substances—

$C_8H_{10}O_4 = \left(\begin{matrix}C_4H_4\\[C_2H_3]2\end{matrix}\right)O_4$ boiling point 131° F. and $C_{10}H_{12}O_4 = \left.\begin{matrix}C_4H_4\\C_4H_5\\C_2H_3\end{matrix}\right\}O_4$ boiling point 185° F.

He has also obtained propyl and anyl glycol.—By the reaction of bromide of propyl ($C_6H_4Br_2$) with acetate of silver he obtained, among other substances, biacetic propyl glycol—

$$\left.\begin{matrix}C_6H_6\\C_4H_3O_2\\C_4H_3O_2\end{matrix}\right\}O_4 = C_{14}H_{12}O_8 \quad \text{and} \quad C_{18}H_{16}O_8 = \left.\begin{matrix}C_{10}H_{10}\\C_4H_3O_2\\C_4H_3O_2\end{matrix}\right\}O_4$$

and infers hence that a glycol may be obtained corresponding to each member of the series $CnHn + {}_2O_2$. These glycols, or diatomic alcohols, may be produced from the bromine compounds of hydrocarbons ($CnHnBr_2$) by substituting for each atom of bromine an equivalent of oxygen and an equivalent of water.—In like manner the triatomic alcohols analogous to glycerine might be obtained from bromides having the composition $CnHn-{}_1Br_3$ by substituting HO_2 for each atom of bromine. M. Wurtz† has succeeded in effecting this. By digesting $C_6H_5Br_3$ with acetate of silver and acetic acid at 248° to 257° F. he obtained triacetin ($C_{18}H_{14}O_{12}$), a neutral oil denser than water, which distilled at 450°.4 F. By the action of caustic baryta upon triacetin three atoms of water are substituted for three atoms of $C_4H_3O^2$ and glycerine is produced, together with three equivalents of acetic acid.

Conversion of Cast-Iron into Steel.—M. Tissier‡ states, that when cast-iron is melted with carbonate of soda it is converted into steel, and lastly into malleable iron. This would appear to account for the fact that wrought-iron retorts, in which sodium is prepared, are not carbonized, although during the operation it is heated to redness in contact with the highly carbonaceous charge.

Bleaching Shellac.—Dr. Wittstein§ recommends the following method :—One pound of shellac is dissolved in four pounds of very strong alcohol, a pound of bleaching powder—containing at least 20 per cent. bleaching chlorine—mixed into a paste with water, strained through linen, and the residue washed with water, until the filtrate amounts to one pound. It is then mixed with a solution of carbonate of potash in three parts of water, until no further precipitate is produced. The precipitate is separated by filtration, the liquid mixed with the warm alcoholic solution of shellac, and hydrochloric acid added until the mixture is decidedly acid. The shellac then separates as white clots, which are to be washed until the water ceases to pass away milky, and then rolled out into thin strips upon a wet board.

Dyeing and Increasing the Weight of Silk.—Some years since, MM. Le-

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* *Comptes Rendus*, xliii., 478. † *Ibid.*, xliv., 780. ‡ *Ibid.*, 51, 8.
§ *Vierteljahresschrift für Prakt. Pharmacie*, vi., 123.

baillif and Lassaigne* observed that such organic substances as albumen, casein, horn, skin, wool, silk, &c., acquired a fine carmine colour by immersion in a solution of proto- and pernitrate of mercury. In this way wool and silk could be dyed by immersion for ten or fifteen minutes in a bath containing one part of mercury for two parts of nitric acid (sp. gr. 1.23) at 113° or 122°. This solution is prepared at a gentle heat, and then boiled for five minutes, so as to convert a portion of the proto-nitrate into pernitrate.—Prof. Millon† proposed the use of this liquid as a reagent for protein substances, and ascribed the red colour which it communicated to them to the action of nitrous acid.—Dr. Wagner‡ suggested the use of this liquid for dyeing horn combs black, by treating the horn which has been coloured red, with sulphide of sodium, so as to convert the mercury into sulphide. For this purpose, four ounces of mercury is dissolved in an equal weight of cold concentrated nitric acid, and the solution diluted with a pound of water. The combs are immersed in this liquid for twelve hours, then washed and immersed in a solution of alkaline sulphide in sixty-four parts of water for one or two hours. He finds§ also that silk may be dyed of a fine red colour by means of the mercury solution. The colour resists the influence of light, of dilute acids, soap, and steam. Moreover, the weight of silk is very considerably increased by the treatment. MM. Lebaillif and Lassaigne found this increase of weight amounted to 17 or 18.5 per cent. on the dry silk. Dr. Wagner has found it as high as 25 per cent. when the immersion and drying are repeated alternately several times. He suggests, also, that the mercurial solution might be advantageously employed for dyeing silk black in the same manner as horn, and at the same time increasing its weight. Among the substances that have been tried for this latter purpose,‖ sulphide of lead becomes gradually converted into sulphate, producing spots in the silk, and sulphide of copper is oxidized for the most part during the drying. Sulphide of mercury appears to be preferable, because of its pure black, its resisting the action of dilute acids, and its great density. Wool is also coloured red, with a tinge of yellowish-brown, by the mercurial solution, and brown-black, by the subsequent application of alkaline sulphides. However, the increase of weight in the case of wool is so very considerable, that this method of dyeing wool would be impracticable.

Cotton that has been treated with casein-ammonia according to Broquette's method, may also be dyed red by means of the mercurial solution. Dr. Wagner suggests that it may be possible to employ cinnabar produced in the wet way, in and upon fibres, in dyeing and printing.

New Method of making Bread.—A report has recently been published by M. Chevreul¶ relating to a method of making bread, which was proposed to the French Academy of Sciences in June, 1856, by M. Mège-Mouriès, and has since been the subject of examination by a committee, consisting of Profs. Dumas, Pelouze, Payen, Peligot, and the author of the report. Three years ago M. Mège-Mouriès communicated to the Academy that he had discovered under the seed husk, within the envelope of wheat grain, a substance having the character of a ferment, to which he gave the name of cerealin. This substance, although a part of the kernel, is separated entirely, or almost entirely, in the bran, and not in the finest flour, which is alone used in Paris for making white bread. He found that a solution of cerealin prepared with bran and water at a temperature of 122° F. had the property of converting starch into a liquid state in the same way as diastase; and he ascribed to the presence of cerealin in the dough of brown bread the circumstance that this bread has a softer crust than white bread, this result being in his opinion due to the conversion of a portion of the starch into a soluble substance under the influence of the cerealin. This action appeared also to account for the more easy digestibility of brown bread than of white bread.

In order to render the results obtained by M. Mège-Mouriès more easily intelligible, it will be necessary to describe the method of making bread hitherto adopted in Paris, and also the new method devised by him.

The Parisian white bread is prepared with the finest flour (1re marque), which

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* *Journ. de Chim. Méd.*, Feb. 1831, p. 92.
† *Comptes Rendus*, xxviii., 40.
‡ *Polytechn. Journ.*, cxxx., 412.
§ *Ibid.*, cxliv., 465.
‖ David, *Handbuch der Seidenfarberei Aarau*, 1855, p. 328.
¶ *Comptes Rendus*, 1857, No. 2.

does not contain any bran. If 100 parts wheat yield 70 parts of this flour, the remainder will consist of 10 parts bran and 20 parts coarse brown meal, this latter consisting of 3 parts fine bran and 17 parts white flour.

The operation is conducted as follows:—About eight o'clock in the evening a mass of dough is prepared with 8 kilogr. flour and 4 kilogr. water, and left till the morning. This is the fresh leaven (*levain de chef*).

Then 8 kilogr. flour and 4 kilogr. water are kneaded up with this mass of dough. This is the *levain de première.*

About two o'clock in the afternoon the mass is again kneaded with 16 kilogr. flour and 8 kilogr. water. This is the *levain de seconde.*

About five o'clock again the mass is kneaded with 100 kilogr. flour and 52 kilogr. water, mixed with 200 or 300 grammes of beer yeast.

At seven o'clock this mass is kneaded with 132 kilogr. flour, 68 kilogr. water, mixed with 300 or 600 grm. yeast and 2 kilogr. salt. The kneading is then completed, and the mass, amounting to 402 kilogr., divided into two portions. The mass serves for six bakings.

One half is divided into small pieces, which are left to rise, and then baked. The bread thus obtained is rather sour, brownish, and without cracks.

The other half of the dough is divided into two portions, one of which is kneaded with 132 kilogr. flour and 68 kilogr. water, containing 300 or 600 grm. yeast, and 2 kilogr. salt. The bread obtained by this second baking is whiter and better than that of the first baking.

For the third baking, one half the remaining dough is kneaded with 132 kilogr. flour and 68 kilogr. water, containing yeast and salt as before.

The fourth and fifth bakings are managed in the same manner. The latter gives the finest kinds of bread.

According to the new method, assuming that 100 kilogr. wheat yield when ground

kilogr.	grm.	
72	720	finest flour, and white meal
15	720	brown meal
15	560	bran

The bread-making operation would be conducted as follows:—

About six o'clock in the evening, 70 grm. of pure yeast, or 700 grm. of ordinary bought yeast, is mixed with 40 litres of water, at 72° F., and 100 grm. starch sugar added. The temperature of the place where this mixture is placed, should be about 72° F.

The next morning, by six o'clock, the liquid will be saturated with carbonic acid, and then the 15 kilogr. 720 grm. brown meal is stirred into it. The fermentation commences at once.

At two o'clock in the afternoon, this liquid is mixed with 30 litres of water, and the whole passed through a sieve, so as to separate the fine bran contained in the brown meal.

In order to separate the flour from this bran, it requires to be mixed with another 30 litres of water, and again passed through the sieve. This water contains 1 kilogr. 800 grm. flour, and serves for mixing with the dough in the subsequent part of the operation.

The 70 litres of liquid give, after being passed through the sieve, about 55 litres, which is mixed with the 72 kilogr. 720 grm. white flour, 700 grm. salt, and the whole kneaded into dough. This dough is separated into pieces, left to rise, and then baked. Thus the bread is made by this new method, of

kilogr.	grm.	
72	720	white flour, and
12	20	flour contained in the brown meal

Hitherto it has been considered that the brown colour of some bread was due to the presence of the bran. But it appears that this opinion is incorrect, and that the colour is in no way due to the bran, but a consequence of the ordinary method of making bread. This was shown to be the case by experiment. In preparing bread by the new method, with flour containing from 2 to 5 parts of bran, which was not separated by the sieve, bread was obtained which had a very pale orange yellow colour, very different from that of ordinary brown bread made by the usual method. The crumb of this bread, when examined even with the naked eye, was evidently coloured yellow by small particles of bran disseminated through the mass.

Another fact that confirms this result is recorded by Colonel Favé. A method was proposed to the French Government by means of which the whole of the flour in wheat was to be converted into white bread. The method consisted in separating the coloured skin of the grain, and it was supposed, in accordance with the prevailing opinion, that when all the coloured portion of the grain was separated the bread obtained would be white. This method was tried, and to the astonishment even of the projector, the bread obtained was brown.

M. Mège-Mouriès, in the first instance, studied the structure of the wheat grain without the aid of the microscope. He found it to consist of

An envelope—*pericarpium*—and the true nucleus.

The pericarpium consists of three parts—

1. The outer portion—*epicarpium*—which is colourless, and has not any cells.
2. The middle portion—*sarcocarpium*—consisting of yellowish cells.
3. The inner portion—*endocarpium*—consisting also of cells.

The true nucleus consists of four parts—

1. The outer skin or envelope—*testa*—and
2. The inner membrane.
3. The albuminous substance—*perispermum*—and
4. The germ—*embryo*.

The microscopic examination of the wheat grain by M. Frécul fully confirms the observations of M. Mège-Mouriès. They agree entirely as to the anatomical composition of the bran. This is produced in grinding or crushing wheat by the rending of the pericarpium, to which the two envelopes of the nucleus adhere, together with the large outermost cells of the albuminous substance, and some cells which contain starch granules, and are situated beneath it.

The larger outermost cells of the albuminous substance do not contain any starch granules, but chiefly cerealin and vegetable casein. The gluten and the starch is situated under these cells.

M. Mège-Mouriès admits the existence, in wheat, of the several substances hitherto described by chemists; but he finds that there is another substance which he calls cerealin, and which, like vegetable casein and gluten, is by a very slight alteration, induced perhaps by contact with atmospheric air, converted into a substance which has the characters of a ferment.

These three substances are all nitrogenous.

Cerealin is soluble in water, insoluble in alcohol. It acts upon starch, dextrine, fruit sugar, and cane sugar, as a ferment. A water solution, when heated to 140° F., loses its efficacy; this is also the case when it is precipitated with alcohol or acids, even carbonic acid. Spirit containing 10 per cent. alcohol precipitates cerealin without destroying its efficacy. Diastase loses its activity at 194° to 212° F., and is in this respect different from cerealin. Cerealin determines the conversion of starch paste into dextrin, of dextrin into sugar, and of sugar into lactic acid; by longer contact into butyric acid. When starch granules are suspended in water the action of cerealin does not take place until the temperature is raised to about 122° F. Since cerealin in its action upon starch does not give rise to the production of carbonic acid, it would not, if acting alone, in the process of bread-making, cause the bread to rise. Cerealin renders bran-milk sour, and makes it colour by contact with the air. Gluten is considerably altered by the influence of cerealin, being converted into a brown substance analogous in appearance to ulmin; also a nitrogenous substance capable of converting sugar into lactic acid, and, besides other products, ammonia.

Casein is, like cerealin, nitrogenous, soluble in water, insoluble in alcohol, and precipitable by acids. Although, under the circumstances in which cerealin acts upon starch, casein is almost inactive, still, in process of time, it does convert starch into dextrin, sugar, and lactic acid.

Gluten, when kept for a time, becomes a ferment, which converts starch successively into dextrine sugar, alcohol, and carbonic acid.

According to M. Mège-Mouriès, the processes taking place in the preparation of bread by the old and new methods may be described as follows:

A. *Old Method of Making Bread.*—Brown bread. The meal used for making brown bread contains all the constituents of the wheat grain, and is therefore in the greatest degree susceptible of alteration by those constituents which act as ferments.

Since cerealin—the most energetic of the ferment substances in wheat—is present

to a greater amount in the meal used for making brown bread than in that used for making white bread, it is natural that its action should in the former case preponderate over that of the casein and gluten; and it is precisely for this reason that the lactic acid fermentation preponderates over the alcoholic fermentation produced by the gluten. The former process preponderates in such a manner, that at first, comparatively more dextrine, sugar, and lactic acid are produced than alcohol and carbonic acid—which cause the rising of the bread—and afterwards there are produced, at the cost of the gluten, ammonia and a brown substance; finally, a portion of the gluten itself passes into lactic acid fermentation, and during the baking starch is converted into dextrine and fruit sugar. Hence it will be seen that these reactions account for the brown coloration of bread and the evolution of ammonia; further, that by diminishing the amount of gluten and by altering it, as well as by the increase in the amount of soluble substances, such as dextrine and sugar, the softer consistence and stickiness of the crumb of brown bread may be accounted for.

It will also be apparent what value is to be attached to the theoretical opinion that brown bread is more nutritive than white. Even in cases where it may be proved that the meal used for brown bread contains more nitrogenous substance than the flour used for white bread, there is no ground for inferring that brown bread is more nutritive than white bread, for, as has been shown, the nitrogenous substances undergo alteration in the process of baking, and yield among other products ammonia.

The flour with which white bread is made does not contain any, or scarcely any, cerealin. Since this substance is almost entirely separated with the bran, the condition of white flour is precisely the most favourable to the preponderance of the alcoholic fermentation over the lactic acid fermentation. The dough of white bread before going into the oven passes through three phases of fermentation—the alcoholic, the acetic, and the lactic. The first must preponderate over the others; it takes place at the cost of fruit sugar, which, if not present in the grain, is developed in the flour. This fermentation is determined by gluten, when no yeast is used. When the alcoholic fermentation proceeds to a due extent, it is necessary that, after the separation of the dough into loaves, so much carbonic acid may be generated that the dough may swell up, or, as it is called, *rise*, without bursting the outer crust. This condition, however, is fulfilled only when the gluten has its full degree of tenacity. On the other hand, care must be taken not to employ a leaven that is too acid, too much fermented, and which may determine the lactic acid fermentation. Such leaven would act like cerealin, and give, even with white flour, bread more or less coloured.

B. *New Method of Making Bread.*—This consists of three operations:

1. The grinding of the corn;
2. The preparation of the dough with flour and water in which the brown meal has been fermented;
3. The baking of the risen dough.

In the grinding, the corn is only once passed between the stones; a single sifting is sufficient to obtain—

a. White flour, consisting of the finest farina and white meal;
b. Brown meal;
c. The coarser and medium bran.

In preparing the dough, the object of fermenting the brown meal with water in which sugar and yeast have been subjected to alcoholic fermentation is—

1. To prevent wholly, or to a great extent, the lactic acid fermentation induced by the cerealin—or to neutralize the cerealin;
2. To effect the separation of the bran; and
3. By kneading the white flour with the fermented liquid and the sediment to obtain a dough which represents the whole farinaceous portion of the wheat.

The advantage of this method consists not only in the separation of the fine bran, but also in the neutralization of the cerealin and in the production of a fresh quantity of ferment, which is sufficient for producing in the whole mass of dough that degree of alcoholic fermentation most suitable for the rising of the dough. The beer-yeast and sugar added to the brown meal determine the neutralization of the cerealin,

which is proved by the fact that, when from two to five parts of bran are left in the dough, the bread obtained is decidedly white. On the other hand, if the fermentation causes the neutralization of the yeast added, still a larger quantity of ferment is produced than neutralized, so that this liquid is particularly well adapted for raising the dough by alcoholic fermentation. Hence the bread prepared by the new method is remarkably light.

The baking of the bread thus prepared is conducted as usual.

At the present it would be hazardous to speak positively with regard to the nature of the several ferments, their number and characteristic properties; but it is at least certain, from the investigations of M. Mège-Mouriès, that the preparation of good bread depends upon the proper management of the fermentation in the dough, and that the production of white or brown bread also depends upon the same condition. The results which he has obtained in this respect, so far as they relate to the nutritive value of bread, furnish another instance of the confirmation of popular opinion, or rather prejudice, by the more extended experimental examination of a subject, and of the disproval of a theoretical view opposed to general custom. It would be interesting, in connexion with this observation, to examine what influence alum may have upon cerealin in the process of bread-making.

While it is certain that cerealin, casein, and gluten may, under certain influences that are not well understood, become ferments, which, as has been shown, act differently under the same circumstances, there is still the greatest uncertainty as to the essential characters of cerealin, of casein, and even of gluten, in their pure state. Consequently it is not possible to understand why casein, although less energetic than cerealin, produces from starch, dextrin sugar and lactic acid; why gluten, which under the influence of the atmosphere may become an alcoholic ferment, is converted, under the influence of cerealin, into ammonia, a brown substance, and a substance which is itself a lactic acid ferment. Lastly, it is still a question whether a nitrogenous substance, in passing through various phases of molecular condition, may not be capable of producing different kinds of fermentation corresponding to these different molecular conditions. These questions are in no wise calculated to throw discredit on the investigation of M. Mège-Mouriès; but, on the contrary, illustrate its novelty and importance, for previously they could not have been put forward in so clear and definite a manner.

In order duly to appreciate M. Mège-Mouriès' labours, it is necessary to consider the operation of grinding wheat as now practised.

The custom in France is to pass the white meal twice between the stones; the brown meal three times; and then to grind the bran to fine bran and medium bran. The flour separated from the first and second white meal only is white, all the other is brown. The other products of the grinding by the present method are not used for making bread. These are, the brans *(issues)*; they consist of white and brown meal *(remoulage blanc et bis)*, brown bran-meal, sharps *(recoupettes ou rougeurs)*, fine, medium, and coarse bran. The Parisian white bread is made only of the finest flour.

The following are the results, reduced to 100 parts, of four grinding operations conducted under the superintendence of M. Mège-Mouriès.

First operation with new wheat, weighing 80 kilogr. the hectolitre :—

White flour	73.899
Brown meal	15.957
Bran	10.144
	100.000

Second operation with old wheat of average quality, weighing 78.66 kilogr. the hectolitre :—

White flour	74.300
Brown meal	12.390
Bran	13.310
	100.000

Third operation with old wheat of average quality, weighing 78.66 kilogr. the hectolitre :—

White flour	72.060
Brown meal	14.250
Bran	13.690
	100.000

Fourth operation :—

White flour	72.720
Brown meal	15.720
Bran	11.560
	100.000

The grinding is much simplified by the method of M. Mège-Mouriès, because the grain is passed only once between the stones, and is only once sifted, by which means only three products are obtained.

1. The fine flour, together with the white meal.
2. The coarse or brown meal.
3. The coarse, medium, and fine bran.

This greater simplicity is obviously an advantage for those who pay for the wheat being ground ; for, with the exception of a very small waste, the sum of the three products should be equal to the weight of the wheat furnished ; and, on the other hand, the respective proportions of these products mutually control each other

For the purpose of testing practically the new method of making bread, four operations were carried out—the three latter comparatively—M. Mège-Mouriès adopting the new method. The following are the results reduced to 100 parts :—

	1st Operation.	2nd Operation.		3rd Operation.		4th Operation.	
	N.	O.	N.	O.	N.	O.	N.
Weight of dough	—	113	131	112	132	113	131
Weight of baked bread when cold	109	90	109	93	113	92	109
Difference in favour of the new method	—	—	19	—	20	—	17

O. represents old method ; N. new method.

There is some difficulty in making comparative experiments, referring to two different methods of making bread. But especial care was taken to obviate, as much as possible, any sources of discrepancy, and to render the experiments comparable. The correspondence between the latter three sets of experiments, and the small difference between the results of the numbers 19, 20, and 17, which express the difference in favour of the new method, are sufficient to admit of the results being regarded with confidence.

The comparative examination of the bread made by the different methods, gave the following results :—

The crumb of bread made by the new method, lost, by drying in the air, 37.5 per cent. The crumb of bread made by the old method, lost 37.8 per cent.

The crust of bread made by the new method, lost, by drying in the air, 14.2 per cent. The crust of bread made by the old method, lost 12.0 per cent.

Prof. Peligot, in repeating these experiments, found that at 248° F., the loss of weight for crust and crumb was 34.9 per cent. on the bread made by the new method, and 34.1 per cent. on that made by the old method. M. Payen obtained nearly the same results.

The bread made by the new method is more easily digestible than that made by the old method, and has been fully approved of in every respect by M. Hamon and Dr. Blatin, after a trial of half a year in the orphan institution of St. Charles.

CIRCUMSTANCES TENDING TO DISGUISE THE PRESENCE OF VARIOUS ACIDS AND BASES IN CHEMICAL ANALYSIS.

BY MR. JOHN SPILLER.

On commencing a series of analyses of iron ores, under the direction of Mr. Abel, I had occasion to make a number of experiments in the endeavour to obtain a more perfect and rapid method than those hitherto employed, of separating phosphoric acid from alumina.

In the course of this investigation, I was incidentally led to bring together, in the same solution, alum, citric acid, phosphate of soda, and ammonia, the citric acid being added in order to retain in solution the alumina and phosphate of alumina. On attempting to precipitate the phosphoric acid as phosphate of baryta, I was astonished to find that no precipitate was produced, and on considering that there was present in the solution, not only phosphoric acid, but also sulphuric acid from the sulphate of alumina, I was naturally led to inquire further into the cause of sulphuric acid and baryta existing together in the same solution.

Since it was evident that this extraordinary result could only be due to the presence of citric acid, a series of experiments were instituted, in order to determine the influence which citric acid exerts on the formation of precipitates in chemical analysis, the results of which I will now proceed to describe.

In order to ascertain the conditions under which the precipitation of sulphate of baryta may be prevented by citric acid and the citrates, sulphate of soda was taken as the source of sulphuric acid, and nitrate of baryta as a convenient salt of that base.

To a mixed solution of sulphate and citrate of soda a small quantity of nitrate of baryta was added; the result was, the formation of a bulky white precipitate of citrate of baryta, which immediately redissolved to a clear solution on agitation. On continuing the addition of successive portions of nitrate of baryta, a point was at last arrived at, when a permanent precipitate of sulphate of baryta made its appearance.

In the next experiment, the object was to ascertain the extent to which citrate of soda will prevent the precipitation of sulphate of baryta, and, for this purpose, weighed quantities of each of the substances were employed.

To a known quantity of citrate of soda, sulphate of soda was gradually added, until, on testing a portion of the mixture, the sulphuric acid was immediately indicated by a drop of solution of nitrate of baryta; and it was found that this point was attained when the equivalents of citric acid to sulphuric acid were in the relation of 1 : 3.

In order to confirm this result, equal weights of carbonate of soda were saturated, the one with sulphuric acid, the other with citric acid; on mixing these the salts in solution consisted of

$$3\,(NaO, SO_3) + 3\,NaO, \overline{Ci}.$$

In such a solution, nitrate of baryta gave no permanent precipitate, but on increasing the proportion of the sulphate of soda, the sulphuric acid was immediately rendered apparent.

With a view to determine whether citric acid exercises a similar protective action over baryta, as it does over sulphuric acid, the experiment was reversed, and the citrate of soda added to the salt of baryta. To a known quantity of citrate of soda, nitrate of baryta was added, until a permanent precipitate of citrate of baryta was formed; the solution at this stage containing

$$2\,(3\,NaO, \overline{Ci}) + 3\,BaO, \overline{Ci}.$$

On adding a little sulphate of soda, an immediate precipitate of sulphate of baryta was produced.

In connexion with this experiment, it may be stated, that the solution of the double citrate of baryta and soda deposited nearly the whole of the citrate of baryta on standing.

It would appear, therefore, that the protective action is on the side of the acid rather than that of the base.

The conditions under which the precipitate of sulphate of baryta is produced, in a solution made according to the first experiment, are the following:—By boiling,

when sulphate of baryta is immediately precipitated; by the addition of an excess of nitrate of baryta; by the addition of hydrochloric, acetic, tartaric, or oxalic acid. The sulphate of baryta, when precipitated from solution by either of these agents, is in a peculiar flocculent condition, totally dissimilar in appearance from that obtained under ordinary circumstances; so finely divided is it, that it readily passes through a filter of Swedish paper. Prolonged boiling, with or without hydrochloric acid, has little effect in changing its physical character.

Citric acid itself has no effect in preventing the precipitation of sulphuric acid by a salt of baryta; and this is probably the reason why the addition of acids to a solution containing a neutral citrate is immediately followed by a precipitation of sulphate of baryta.

These results having been obtained by the use of a baryta salt, it became interesting to know whether the sulphates of strontia and lead were, in like manner, prevented from precipitation by citrate of soda.

To a mixture of sulphate and citrate of soda, nitrate of strontia was added, when no indication of sulphuric acid was observed, the salt of strontia behaving in a precisely similar manner to that of baryta under the same circumstances.

Nitrate of lead substituted for the baryta or strontia in these experiments gave the same result, no sulphate of lead being produced. But sulphate of lead differs from the sulphates of baryta and strontia, in being soluble, after precipitation, in citrate of soda.

My attention was next directed to the power which the citrates possess in influencing the general reactions which characterize the acids and bases in the ordinary course of chemical analysis.

Baryta.—Of the compounds of baryta there is not one that is precipitated when the acid is previously combined with citrate of soda, whether the reaction of the solution be acid or alkaline. The salts of this base, which have been made the subject of experiment, are, besides the sulphate, the phosphate, carbonate, borate, oxalate, tartrate, citrate, and fluoride. With the exception of the sulphate, all these compounds, after precipitation, are again dissolved in neutral citrate of soda.

Strontia.—The acids which were tried in connexion with this base were sulphuric, phosphoric, and carbonic, all of which compounds were retained in solution.

Lime.—Of the lime salts, the carbonate, phosphate, and oxalate were found to follow the general rule, both with respect to prevention of precipitation, and in being redissolved in citrate of soda if once produced.

The fact of oxalate and phosphate of lime being soluble in citrate of soda, suggests the possibility of this salt being employed with advantage in diseases arising from the formation of these descriptions of calculi.

As lime is the reagent generally recommended for the detection of citric acid, it is important to bear in mind that the citrate of lime will not be thrown down on boiling, unless the chloride of calcium be added in sufficient quantity to decompose the greater portion of the alkaline citrate, since the double citrate of lime and soda does not give any precipitate on boiling.

Magnesia.—The salts of this base appear to be less affected by the presence of citrate of soda, hydrate of magnesia and the ammonio-phosphate of magnesia being precipitated as usual. The phosphate and carbonate are, however, held in solution.

The next group, consisting of the sesquioxides of iron, chromium, and aluminium, are not precipitated by their usual group-test—ammonia. The phosphates of these oxides are also retained in solution by citrate of soda.

Chromium, in the state of chromic acid, is not detected by lead, silver, bismuth, or baryta. The chromate of lead does not even appear on the addition of acetic acid.

Sesquioxide of Iron.—A solution of sesquichloride of iron is not precipitated by ferrocyanide of potassium, benzoate, or succinate of ammonia ; nor is the coloured reaction produced with acetate of potassa, ferricyanide, or sulphocyanide of potassium. The reaction between sesquichloride of iron and ferrocyanide of potassium is curiously modified. On mixing these two solutions in the presence of an alkaline citrate, a yellow solution is formed, which becomes deep blue in colour on largely increasing the amount of ferrocyanide of potassium ; no precipitate of Prussian blue is produced until hydrochloric acid in excess is added.

From the fact that a salt of iron does not precipitate benzoic and succinic acids in presence of a citrate, the detection of these acids becomes exceedingly difficult, as

we are not able to avail ourselves of any of the methods previously adopted for the decomposition of the citrate.

The group comprehending the protoxides of iron, manganese, nickel, cobalt, and zinc, are variously affected by their group-test—sulphide of ammonium. The sulphides of nickel, cobalt, and zinc are precipitated as usual; sulphide of iron incompletely; and sulphide of manganese not at all.

Protoxide of Iron.—Neither potassa nor ammonia will precipitate this base in the presence of citric acid. The alkaline product so obtained gives, with sulphide of ammonium, if dilute, a dark olive-green solution, but if more concentrated, an immediate precipitate, with a supernatant liquid of that colour. The sulphide of iron comes down, however, on boiling, or on standing for a sufficient length of time in the cold. The protophosphate of iron is held in solution, and the reaction between ferricyanide of potassium and a protosalt of iron is entirely masked.

Oxide of Manganese.—The most striking result observed under this head relates to the behaviour of the sulphide. The flesh-coloured precipitate usually obtained on adding sulphide of ammonium to a salt of manganese, does not appear under these circumstances, and the sulphide, after precipitation, is freely soluble in an alkaline citrate. If citrate of ammonia be the solvent employed, vapour of sulphide of ammonium is evolved on boiling. The protoxide of manganese is not precipitated by potassa, nor the carbonate by carbonate of soda, in presence of a soluble citrate. On exposure to air, the brown binoxide of manganese separates from the former only of these solutions.

Oxide of Nickel.—A salt of nickel gives, with sulphide of ammonium, the ordinary black precipitate of sulphide of nickel; but the other reagents, as potassa, carbonate of soda, and ferrocyanide of potassium, fail to give their usual indications.

Oxide of Cobalt.—Solutions of this metal behave in a similar manner to those of nickel, with the several reagents just mentioned. The alkaline solution of protoxide of cobalt in potassa deposits the sesquioxide on exposure to air.

Oxide of Zinc.—This oxide resembles magnesia, in being precipitated by potassa in the presence of a citrate. The carbonate of zinc is retained in solution, but the sulphide and ferrocyanide are not influenced.

Sesquioxide of Uranium.—The phosphate and ferrocyanide of uranium are not precipitated in the presence of citrate of soda.

The metals of the sulphuretted hydrogen group are, with the exception of arsenic, precipitated as usual by their group-test. Several of their principal reactions are completely disguised, as will appear on describing these metals individually.

Oxide of Lead.—Besides the oxide itself, the sulphate, phosphate, carbonate, and oxalate, the bromide, iodide, cyanide, and ferrocyanide are all retained in solution on the addition of their respective precipitants. The only compound of lead, of those experimented upon, which made its appearance as under the usual circumstances, was the sulphide. The chromate has been already referred to as having its characters completely masked.

Oxide of Silver.—Inasmuch as the nitrate of silver is frequently employed for the detection and discrimination of several acids, both organic and inorganic, it was thought advisable to make a careful study of the more important compounds of this metal, and to trace their connexion with the ordinary process of analysis.

Nitrate of silver, if added in small quantity to a solution of neutral citrate of soda, gives rise to a precipitate, which, on agitation, is completely redissolved, but on continuing the addition of the nitrate of silver, a permanent precipitate is at last produced. As this final effect can only result in the destruction of the citrate of soda, and the removal of the citric acid as an insoluble silver-compound, it follows that no interfering influence need be anticipated in the ordinary course of testing for acids.

Among the compounds of silver, insoluble under ordinary circumstances, but which are held in solution through the medium of citrate of soda, are the carbonate, phosphate, oxalate, tartrate, and citrate. On the contrary, the sulphide, chloride, bromide, iodide, ferrocyanide, and sulphocyanide are precipitated as usual. The cyanide of silver is slightly soluble in this reagent, so that, in its presence, very dilute hydrocyanic acid is not precipitated by nitrate of silver. Oxide of silver resembles magnesia and oxide of zinc in being thrown down by potassa under all circumstances.

Suboxide of Mercury.—By adding potassa to a salt of this base, in the presence of citric acid, the suboxide of mercury is resolved into protoxide, which remains in

solution, and metallic mercury, precipitated in the form of minute grey globules. The chloride, bromide, and iodide, corresponding to the suboxide, are precipitated in the usual manner.

Protoxide of Mercury.—The sulphide and iodide are not sensibly influenced in their precipitation; the latter is very sparingly soluble in citrate of soda, so that, in a highly dilute solution, the scarlet iodide does not make its appearance. The oxide and carbonate are retained in solution, and if to either of these alkaline liquids, ammonia, or one of its salts, be added, the white precipitate (chloride and amide of mercury) is immediately thrown down. The fact that oxide of mercury is not precipitated by carbonate of soda in the presence of certain salts, and that, on the addition of any compound of ammonia, an immediate precipitate is produced, is not new. A solution of protochloride of mercury, chloride of sodium, and carbonate of soda has long since been employed by Mr. E. O. Brown as a test for ammonia; and so delicate is the test, that the slightest trace of ammonia is indicated by an opalescence throughout the liquid.

Teroxide of Bismuth.—Neither this oxide nor the carbonate is precipitated if citric acid be present, nor is the terchloride of bismuth decomposed by water. The sulphide is, however, not appreciably affected.

Oxide of Copper.—This oxide and the carbonate are both retained in solution; the sulphide and ferrocyanide are precipitated in the usual manner.

Oxide of Cadmium.—The carbonate and oxide of this metal are also retained in solution, but not so the sulphide, which is completely precipitated.

Protoxide and Binoxide of Tin.—Both these oxides may be retained in alkaline solution on the addition of ammonia. The sulphides of tin are completely precipitated as under the ordinary circumstances.

Teroxide of Antimony.—The addition of citric acid prevents the precipitation by water of the terchloride of antimony, but does not interfere with the separation of this metal by sulphuretted hydrogen.

Antimonic Acid.—The precipitation of the pentasulphide of antimony does not appear to be so complete as in the case of the tersulphide; the separation of the last portion was attended with difficulty in some of my experiments.

Arsenious and Arsenic Acids.—The characteristic reactions of arsenic are modified in a remarkable manner. A solution of arsenious acid, to which citric acid or a neutral citrate has been added, is no longer precipitated by sulphuretted hydrogen in the cold or on boiling. The tersulphide of arsenic is also readily soluble in citric acid or a citrate. Hydrochloric acid added to either of these solutions, at once separates the whole of the arsenic.

The pentasulphide imitates the deportment of the tersulphide under the circumstances recorded above.

The arsenites of silver, copper, lime, and baryta, and the arseniates of lead, silver, and baryta, are entirely kept in solution.

From a consideration of the circumstances under which the sulphides of arsenic may be preserved in a soluble form, while the same compounds of tin and antimony are completely precipitated, I have been induced to attempt the analytical separation of these metals by such a process. My experiments have not yet been sufficiently numerous to enable me at the present time to point out the conditions under which their perfect separation may be accomplished, but I have every reason to believe that a quantitative method may be based upon this principle.

Teroxide of Gold.—The precipitation of the sulphide of gold takes place as under ordinary circumstances, but the reaction with protochloride of tin is modified to the extent of the production of a dingy green precipitate, instead of the brilliant purple of Cassius.

Binoxide of Platinum.—The bisulphide of platinum is precipitated on boiling, but not readily in the cold. The double chloride of platinum and ammonium has an increased tendency to assume a crystalline condition, perhaps on account of its formation being slightly retarded.

Finding citric acid to exert such remarkable solvent powers in many of the instances enumerated, I extended the inquiry to a few substances, where a parallel action might have been expected. With this intention, tartaric and racemic acids, glycerine, and the sugars were selected, and their interfering action in some few cases determined.

Tartaric acid prevents the precipitation of a salt of cobalt by potassa, and, in the

form of a neutral tartrate, retains in solution sulphate of lead and the sulphide of manganese; Prussian blue is not formed in its presence; and the precipitation of sulphate of baryta is to a small extent retarded.

Racemic acid also slightly retards the precipitation of sulphate of baryta.

Glycerine has, seemingly, no influence in preventing the precipitation of Prussian blue, sulphide of manganese, or sulphate of baryta.

Under the head of the sugars, the only circumstance met with worthy of record, was the power of grape-sugar to prevent, in the cold, the formation of sulphide of manganese. Neither cane nor milk-sugar appeared to have any influence in this direction.

These examples fully confirm the fact long known, that many kinds of organic matter exert a very considerable influence on the formation of precipitates in analytical chemistry, and suggest the necessity of eliminating all these interfering circumstances before testing for the inorganic bases. It is, then, good policy to carry out the instructions of the analytical tables, when, after treatment of the unknown substance with hydrochloric acid and sulphuretted hydrogen, it is recommended to evaporate the filtrate to dryness and to clear organic matter, before proceeding to search for metals belonging to either of the subsequent groups.

Before concluding the account of my experiments on the properties of citric acid, I cannot refrain from mentioning a difficulty early experienced in the detection of tartaric acid, when mixed with a large proportion of citric acid. So imperfect is the ordinary method of proceeding—that of employing a lime-salt to precipitate, in the cold, the tartaric acid as tartrate of lime—that I think it possible for citric acid to be adulterated with as much as ten per cent. of tartaric acid, without fear of detection. Desiring to ascertain the purity of the sample with which I worked, my attention was naturally directed to this point. By the following process we are enabled to detect the presence of tartaric acid in cases where the old method would not be successfully employed.

To a concentrated aqueous solution of the acid under examination, acetate of potassa is added, and subsequently strong alcohol to the amount of an equal bulk; on stirring with a glass rod the crystalline bitartrate of potassa separates, time being allowed when small quantities only are suspected. By this means it is possible to detect a much smaller amount of this impurity in citric acid.

The same mode of proceeding may be turned to useful account, if the relation between these two acids be reversed. By first separating the tartaric acid as above, and afterwards evaporating the alcoholic filtrate over a water-bath, the citric acid may be detected in the residue, by boiling with excess of chloride of calcium in the usual manner.

For the explanation of these curious phenomena I am not able to bring forward any hypothesis with the same degree of confidence that I have treated the facts themselves. The only possible way that has suggested itself to my mind of accounting for the property possessed by citric acid, of retaining in solution substances which, under ordinary circumstances, are insoluble, is to suppose a neutral salt of citric acid to be endowed with the power of combining, on the one hand, with another salt, containing the *acid* of the compound whose formation is prevented, in such a manner as to produce a class of double salts of the general composition:—

$$(3MO,\overline{Ci}) + 3(MO,SO_3),$$

in which the term SO_3 is capable of being replaced by CO_2, CrO_3, BO_3, $\overline{O}$, &c.; or, in the case of PO_5, a tribasic acid, one equivalent only will be required to take the place of three equivalents of SO_3.

On the other hand, it must be allowed that an alkaline citrate has a tendency to combine with the citrate of another *base*, even though this latter compound be of itself but slightly soluble in water. The affinity existing between the two constituents of the double citrate, taken in conjunction with that exerted in the formation of the class of double salts, just now referred to, might, it is suggested, determine in favour of the non-precipitation of the otherwise insoluble body involved.

The ascertained facts upon which this hypothesis has been principally constructed, may be shortly stated to consist in the power of one equivalent of citric acid to mask the reactions of either three equivalents of sulphuric or carbonic acid, or one equivalent of the tribasic phosphoric acid; while the existence of a class of double citrates, as those of soda with silver, lime, and baryta respectively, has been rendered highly probable in the course of this investigation.

Additional confirmation is also derived from the circumstance that the carbonates of baryta and lead dissolve in a neutral citrate with production of an alkaline liquid, the new metal remaining in solution in the form of a double citrate. And again, the alkaline product of the action of carbonate of soda on a salt of manganese, in presence of citrate of soda, does not deposit binoxide of manganese on exposure to the oxidising influence of the air, while another solution, containing caustic potassa in place of the carbonate, is constantly absorbing oxygen. An analogous instance in the case of cobalt need scarcely be quoted. All these reactions are explicable, in my opinion, on the view advanced; the affinity of carbonic acid for these several bases, though weak, is strengthened by the formation of a citrocarbonate.—*Quarterly Journal of the Chemical Society.*

ON THE COMPARATIVE DEGREES OF AFFINITY OF IODINE, BROMINE, AND CHLORINE FOR SILVER.

Mr. F. Field has recently read a paper on this subject before the Royal Society. Chemists have generally considered that all salts of silver, even the insoluble ones, are decomposed by solutions of the chlorides, with formation of chloride of silver. From the experiments of Mr. Field, however, it appears that this is not the case. He finds, on the contrary, that chloride of silver is completely decomposed by solutions of the bromides and iodides; and shows that, under this set of conditions, bromine has a greater affinity for silver than chlorine, and iodine a still greater affinity than bromine. Under different circumstances, however, the play of affinity is altered, both bromide and iodide of silver being decomposed by chlorine at an elevated temperature. He states that—

When a mixed solution of bromide of potassium and chloride of sodium is added gradually to a solution of nitrate of silver, *not in excess*, no trace of chloride of silver is precipitated, as long as any bromine remains in solution.

If, for example, one equivalent of nitrate of silver is dissolved in water, and one equivalent of bromide of potassium and one of chloride of sodium be added, the latter will be left quite intact, and bromide of silver and nitrate of potassa will alone be formed.

If, to a similar solution, iodide and bromide of potassium and chloride of sodium be added, iodide of silver and nitrate of potassa are formed, the bromide of potassium and chloride of sodium remaining undecomposed.

When bromide of potassium is poured upon chloride of silver, an entire decomposition ensues, bromide of silver and chloride of potassium being produced.

When iodide of potassium is added to chloride of silver, iodide of silver and chloride of potassium are formed; and when iodide of potassium is added to bromide of silver, there is a similar decomposition, the iodine replacing the bromine.

When chloride of silver in excess is agitated in a solution of iodide of potassium, and warmed for some hours, no trace of iodine can be detected in the solution; when, however, chloride of sodium is poured upon iodide of silver, no decomposition occurs, neither is there any action upon bromide of silver with the same salt; and when bromide of potassium is added to iodide of silver, there is no alteration in the union of the elements.

From the foregoing results I deemed it possible that the separation of chlorine, iodine, and bromine, could be performed with great ease. The following experiments confirm this idea, although the slight solubility of the precipitates in excess of the precipitants, when the latter are warm and concentrated, render great care necessary; considerable caution must also be employed by the manipulator with regard to the quantities he uses.

1st Experiment.—5 grains each of the iodide and bromide of potassium and chloride of sodium were dissolved in water, and precipitated by excess of nitrate of silver. The precipitate, after washing and heating until it began to fuse round the edges, weighed 27.19 grains (the theoretical number being 27.21): the same quantities of the three bodies were dissolved in another portion of water, precipitated as before with nitrate of silver, and the washed precipitate digested with a solution of bromide of potassium in the cold for about 10 hours. On washing and weighing the precipitate finally obtained, it was found to weigh 30.87 grains. As the difference between the equivalents of bromide of silver and chloride of silver (44.5) is to the equivalent of the chloride of silver (143.6), so is the difference in weight after digesting in

bromide of potassium, to the quantity of chloride of silver originally present. Thus, in the experiments referred to, 3.68 grains being the difference in weight of the precipitate after digestion,

44.5 : 143.6 :: 3.68 : 11.86—Chloride of silver found.

The quantity of chloride of silver calculated from the 5 grains of chloride of sodium is 12.25 grains.

In the second experiment, the liquid was kept gently warmed during the operation, and the precipitate, after treatment, weighed 30.95 grains, which, by the rule above referred to, equals 12.13 grains of chloride of silver.

2nd Experiment.—5 grains of iodide and bromide of potassium and 5 grains of chloride of sodium were precipitated in the same manner, with nitrate of silver, and the precipitate was digested for 12 hours in a solution of iodide of potassium. The precipitate, after washing and incipient fusion, gave 36.83 grains.

As the difference of the equivalents of bromide and iodide of silver (47.1) is to the equivalent of bromide of silver (188.1), so is the excess in weight of the precipitate after digestion in iodide of potassium, to the weight of bromide of silver originally present.

In this experiment, therefore, the difference in weight of the precipitate after digestion being 6.02 grains, the calculation is as follows:—

47.1 : 188.1 :: 6.02 : 24.04

30.87 — 24.04 = 6.83 Ag I.

Iodide of silver obtained from precipitation of the nitrate by 5 grains of iodide of potassium = 7.07.

By reversing the figures in the previous calculation of the chlorine and bromine, we can arrive at the quantity of bromide of silver, after deducting the quantity of iodide of silver found in the subsequent experiments.

The following is a table showing the results by calculation and analysis:—

Experiment.		Theory.	
5 grs. KI	= 6.83 Ag I.	5 grs. KI	= 7.06 Ag I.
" KBr	= 8.26 AgBr.	" KBr	= 7.87 AgBr.
" NaCl	= 11.86 AgCl.	" NaCl	= 12.25 AgCl.

We have, therefore, the following quantities of iodine, bromine, and chlorine by experiment and calculation, as deduced from the silver salts:—

	Experiment.		Theory.
Iodine	3.69	.....	3.81
Bromine	3.51	.....	3.34
Chlorine	2.92	.....	3.02

and the quantities of iodide, bromide, and chloride calculated from the silver salts, are as follows:—

Experiment.		Theory.
4.85 KI	.....	5 grs. KI.
5.23 KBr	.....	5 grs. KBr.
4.84 NaCl	.....	5 grs. NaCl.
14.92		15.00

Although by the description the above method may appear long and tedious, the actual experiment is not so. After weighing three equal portions of the salts to be analysed, they are placed in three flasks with ground glass stoppers, and about an ounce of water is added to each; nitrate of silver being then added, slightly in excess, to the three, the stoppers are replaced, and each flask agitated violently. The precipitates subside in a few minutes, leaving the supernatant fluid perfectly clear. They are then filtered through separate funnels, and washed with hot water. No. 1 is dried and weighed. No. 2 is digested in bromide of potassium, dried, and weighed, and No. 3 in iodide of potassium, dried, and weighed.

Although the results above stated are not very far from the truth, more experiments are necessary before this method can be admitted into quantitative analysis. The great fear, as already stated, is that the solutions of the liquids in which the silver compounds are digested should be made too concentrated, in which case the latter are dissolved to some slight extent, even in the cold. By preliminary experiments on the part of the analyst, and a knowledge of the quantities of the substance taken, great excess may of course be avoided.—*Quarterly Journal of the Chemical Society*, Oct., 1857.

METHOD OF DETERMINING THE QUANTITY OF MORPHIA IN OPIUM.

BY M. FORDOS.

The determination of the quantity of morphia in opium is a subject of very great interest in a medical point of view. It is to the presence of this alkaloid, endowed with very energetic action on the animal economy, that opium owes, if not all its properties, at least those for which it is chiefly used in medicine. The opiums which are found in commerce have a very variable composition. The quantity of morphine may vary from nothing to 14 per cent., and even beyond that in indigenous opium. It will therefore be seen what uncertainty is involved in the employment of this substance, if the proportion of morphia be not determined previously to its use in pharmaceutical preparations. A great number of processes for its analysis have been published, but they all present practical difficulties, which prevent our always arriving at a satisfactory conclusion.

This question has been made the subject of a prize by the Belgian Academy of Medicine.

The process which I am about to describe for ascertaining the quantity of morphia, is easily performed, and furnishes results which are very accurate.

Fifteen grammes of the opium, cut in thin slices, are macerated in sixty grammes of water, occasionally stirring the liquid. After twenty-four hours the product of maceration is turned into a mortar, and the opium thoroughly disintegrated with the pestle. The whole is then poured on a small filter, and, after the liquid has run through, the filter is washed with fifteen grammes of water, which have also served to rinse the mortar and flask in which the maceration was performed. The washings are repeated a second and third time with ten grammes of water each time. The opium is then sufficiently exhausted. A third part of the liquid is taken for determining the quantity of ammonia necessary for the precipitation of the morphia. The ammonia is added drop by drop, using a graduated burette, and stopping the moment the liquid presents a slight ammoniacal odour. The quantity of ammonia employed is then noted down.

The quantity of morphia is determined in the remaining two-thirds of liquor, which represents ten grammes of opium.

To the liquor is added an equal volume of rectified spirit and a quantity of ammonia, exactly double that used in the first experiment. (It is necessary to add a slight excess of ammonia, to obtain the complete separation of the morphia.) The liquid is then agitated, and allowed to stand in a well-closed flask. It soon deposits crystals, some in fine needles, very little coloured, which is narcotine ; the others in prisms, more bulky, and a little more coloured, are morphine. After two or three days the flask is well agitated, and allowed to stand again for some hours, to give the morphia time to precipitate completely. The crystals are then collected upon a small filter, and washed with about half an ounce of proof spirit. This washing removes the mother-liquor and the colouring matter. There remain on the filter crystals of morphine, which are slightly coloured, and crystals of narcotine, which are colourless. The filter is dried upon the same funnel, two or three drachms of ether added, and, after that, three or four drachms of chloroform at twice. The crystals of narcotine instantly dissolve in the chloroform, and are removed with it. The chloroform does not affect the morphia. The filter is finally washed with three drachms of ether, to remove the last traces of chloroform and narcotine, and then dried. The crystals of morphia, which are removed with great facility, are weighed.

In the process which I have just described, in treating the opium with water, all the morphia which exists in combination is easily dissolved with very little narcotine and a little resinous and colouring matter. If ammonia be added to the aqueous solution, a dirty precipitate is obtained of morphia, narcotine, and colouring matter. The addition of the alcohol retards the precipitation of the alkaloids, and gives them time to assume the crystalline form. The alcohol also retains in solution the resinous and colouring matter. Nearly colourless crystals are therefore obtained.

Washing the morphia with chloroform is a very simple operation, which completely separates all the narcotine.

ON A SYSTEM OF TRAIN-SIGNALLING.

BY MR. C. V. WALKER.

The following was read at a recent meeting of the Royal Society:—

When, in the early days of telegraphy, messages were sent and trains were signalled on the same wires, no facilities existed for reducing the apparatus employed for the latter purpose to a simple form. The case is now becoming different, special wires being largely devoted to train signals; hence the present system.

The *instrument* employed is a large electro-magnet, with a movable armature, carrying a stem and a hammer, which latter strikes on a bell by the direct force of magnetism. It is provided with a contact-maker, a spring, the depression of which causes a current to circulate. The bobbins are 4 in. × 3 in.; and are filled with 10 lbs. of covered copper wire, No. 16 or No. 18. The core is of five-eight inch iron. The armature and appendages weigh $2\frac{1}{4}$ oz. Bells of this kind have been in action for five years without cleaning or repairing. The battery is zinc-graphite, and a solution of 1 sulph. ac. + 8 or 10 water. The plates, $7\frac{1}{2}$ in. × 3 in., are placed in stone pots that contain about a quart, the zinc standing in a gutta-percha slipper, containing mercury. Batteries of this kind will do their work untended for half a year and longer.

The *language* consists of blows on the bell; the number of blows varies according to the train-signal to be given. The distinctions required for ordinary purposes being few, the bell-language is very appropriate, from its addressing the ear, from its simplicity, and from the facility with which the signals are given and taken. *One* blow is for the starting of an ordinary train; *two*, for an express; *three*, for the arrival of a train; *five*, for stopping all trains; *six*, for testing. This is a general code; other forms of code are used for protecting level crossings and junctions; but the fundamental signals of the general code are of universal application. This system was introduced five years ago on the South-Eastern Railway; and at the present time consists of about 100 bells, to which additions are in progress.

The bells are connected in pairs, both bells being in a circuit that terminates in the earth in the usual way, at each station. The signal is made by depressing the spring from its earth-contact, upon the zinc end of the battery, the graphite end being in permanent connexion with the earth. The battery being thus introduced between the bell and the earth, a current circulates along the wire, and produces one blow upon the bell. The home-bell may be excluded or not from the circuit when a signal is sent.

By the above arrangement, signals are sent from station to station. But the extreme simplicity of the battery, the bell, and the language, allows the arrangements to be so modified that signals may be made on a pair of bells from any joint, intermediate between two bell-stations, without the necessity of providing the signaller with any telegraph or battery, or any electrical apparatus whatever. The addition of this property to the bells does not in any way interfere with their being in perfect action and constant use for the ordinary work of train-signalling; and therefore, if the guards of trains and the platelayers of the permanent way are provided with a signal for expressing their wants, a great advance is made in telegraphy, and a large element of safety is gained for the travelling public.

It is well known to electricians, that, if two equal and opposed currents are presented to the respective ends of a wire, no evidence is manifested of the circulation of electric force; the wire is in a null state, as much so as if no current was presented to it. Taking advantage of this law, in connexion with the simple bell-system above described, the circuit is made to contain the two batteries, one at each station, as well as the pair of bells; the same pole—the graphite, for instance—of each battery being connected with the earth.

When the home-station signaller desires to make a signal, he depresses the spring as before; but the connexions are such, that by this act he excludes his *own* battery from the circuit. The circuit then contains but one battery—namely, that at the pass station; the current of which is now able to circulate from end to end, being no longer counterbalanced by an equal and opposite current; and consequently the bells are sounded. This, then, is the process for ordinary train-signalling, under this arrangement.

By altering the contact-maker so that it inverts the battery in the circuit, instead

of putting it out of circuit, both batteries are made available for each signal; and consequently the power, and with it the cost, of each may be reduced.

But the null state of the wire is equally well and very readily destroyed, by connecting it with the earth at any point intermediate between the two stations; for by this process a complete circuit is made or channel opened for the discharge of both ends of both batteries, each independently of the other, except that the attached wire between the earth and the telegraph wire is common to both circuits, and thus the bells at the respective stations are actuated by the batteries of the respective stations. If ten blows with a pause of a minute, and then ten more, is the signal that the engine is disabled; ten blows, and a minute of contact, that an accident has happened; a ringing continued beyond ten, that the permanent way is obstructed; the stations at either side are advised and can take the measures necessary to meet the case.

These contacts may be made by hooking a wire or rod on to the line-wire, and making the necessary contacts with the rail; or, which is better, by establishing contact-makers, properly secured at frequent intervals on the telegraph posts.

This system gives to those in charge of disabled trains a certain means of asking for assistance from any point of the open railway, without any training beyond that of *counting ten* slowly and correctly. In practice, as between Red Hill and Reigate, no inconvenience or loss of electricity has been suffered from counterbalancing the two currents.

The author states that there are other properties of opposed currents to be communicated on another occasion.—*London, Edinburgh, and Dublin Philosophical Magazine.*

ARTESIAN WELLS IN THE DESERT.

The *Moniteur Algérien* brings an interesting report on the newly bored Artesian wells in the Sahara Desert, in the province of Constantine. The first well was bored in the Oasis of Oued Rir, near Tamerna, by a detachment of the Foreign Legion, conducted by the engineer, M. Jus. The works were begun in May, 1856, and on the 19th of June a quantity of water of 4010 litres per minute, and of a temperature of 21° Réaumur, rushed forth from the bowels of the earth. The joy of the natives was unbounded; the news of the event spread towards the south with unexampled rapidity. People came from long distances in order to see the miracle; the Marabouts, with great solemnity, consecrated the newly-created well, and gave it the name of "the well of peace." The second well, in Temakin, yielded 35 litres, of 21° temperature, per minute, and from a depth of 85 metres; this well was called "the well of bliss;" a third experiment, not far from the scene of the second, in the Oasis of Tamelbat, was crowned with the result of 120 litres of water per minute. The Marabouts, after having thanked the soldiers in the presence of the population, gave them a banquet, and escorted them in solemn procession to the frontier of the oasis. In another oasis, that of Sidi-Nached, which had been completely ruined by the drought, the digging of "the well of gratitude" was accompanied by touching scenes. As soon as the rejoicing outcries of the soldiers had announced the rushing forth of the water, the natives drew near in crowds, plunged themselves into the blessed waves, and the mothers bathed their children therein. The old Emir could not master his feelings; with tears in his eyes, he fell down upon his knees, and lifted his trembling hands, in order to thank God and the French. This well yields not less than 4300 litres per minute, from a depth of 54 metres. A fifth well has been dug at Oum Thiour, yielding 108 litres per minute. Here a part of the tribes of the neighbourhood commenced at once the establishment of a village, planting at the same time hundreds of date palms, and thus giving up their former nomadic life. The last well is that of Shegga, where soon an important agricultural centre will spring up. There is no doubt but that these wells will work in these parts a great social revolution. The tribes which, after the primeval custom of their ancestors, kept wandering from one place to another, will gather round these fertilising springs, will exchange the herdsman's staff for the plough of the farmer, and thus take the first steps towards a civilization which, no doubt, will make rapid progress in Northern Africa.—*Journal of the Society of Arts.*

THE WATER SUPPLY WITH REFERENCE TO EPIDEMIC CHOLERA.

The southern districts of London (comprising nearly a fifth of the entire population of the metropolis) have presented a complete proof of the importance of a pure water supply in relation to the ravages of cholera. For throughout those districts, during the epidemic of 1853-4, there were distributed two different qualities of water, so that one large population was drinking a tolerably good water, another large population an exceedingly foul water ; while in all other respects, these two populations (being intermixed in the same districts, and even in the same streets of these districts) were living under precisely similar social and sanitary circumstances. And when, at the end of the epidemic period, the death rates of these populations were compared, it was found that the cholera mortality in the houses supplied by the bad water had been 3½ times as great as in the houses supplied by the better water. This proof of the fatal influence of foul water was rendered still stronger by reference to what had occurred in the epidemic of 1848-9 ; for on that occasion one of these companies (which soon afterwards improved its supply) was giving even a worse water than its rival ; and the population supplied by it had at that time suffered a proportionate cholera mortality. So that the consequence of the improvement made by this water company in the interval between the two epidemics, was, that whereas in the epidemic of 1848-9 there had died 1925 of their tenants, there died in the epidemic of 1853-4 only 611; while among the tenants of the rival company (whose supply between the two epidemics had become worse instead of better) the deaths, which in 1848-9 were 2880, had in 1853-54 increased to 3476.* And when these numbers are made proportionate to the populations or tenantries concerned in the two periods respectively, it is found that the cholera death-rates per 10,000 tenants of the companies were about as follows :—For those who in 1848-9 drank the worse water, 125 ; for their neighbours who in the same epidemic drank a water somewhat less impure, 118 ; for those who in 1853-4 drank the worst water which had been supplied, 130 ; for those who in this epidemic drank a comparatively clean water, 37. The quality of water which (as is illustrated in the first three of these numbers) has produced such fatal results in the metropolis—causing two-thirds of the cholera deaths in those parts of London which have most severely suffered from the disease—has been river water polluted by town-drainage ; but in other instances there is reason to believe that some of the most destructive outbreaks of cholera which have occurred in particular groups of houses have depended on the use of well water into which impurities had either been carelessly thrown, or had drained or leaked through the adjoining soil.—*Extract from Report of the General Board of Health*, Sept. 29, 1857.

INDURATION OF PLASTER OF PARIS CASTS.

A Neapolitan builder, Signor Abate, has submitted to the Académie des Sciences numerous specimens of plaster casts as hard as marble, and as susceptible of receiving a fine polish. Instead of saturating the plaster, as is ordinarily the mode of proceeding, with eight times its volume of water, Signor Abate combines it with the minimum quantity of water, whereby porosity is avoided, and the consequent liability to disintegration of the mass after exposure for a certain time to the atmosphere. For this purpose the plaster is reduced to a state of powder in a horizontal cylinder, to which rotary motion is communicated, and steam is admitted into the interior. By this means the quantity of water absorbed by the plaster may be regulated as desired. The plaster thus prepared still remains in a powder, and in that state is filled into moulds and submitted to hydraulic pressure for a short time. The moulded articles are removed from the moulds and found to possess great compactness, and to take a fine polish.—*Journal of the Society of Arts.*

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* Subsequently to the epidemic of 1854 this Company has had recourse to purer sources of supply.

STARCH FROM HORSE CHESNUTS.

Horse chesnuts have been in considerable demand throughout the provinces of France, at prices equal to those paid last year by the starch makers for potatoes. They are required for a manufactory at Nanterre, near Paris, for the production of starch. The starch thus obtained, from a hitherto useless fruit, will take the place of that now obtained from cereals and potatoes; to that extent rendering so much more food available for consumption in the country. The horse chesnut grows readily throughout France, even in the worst soils. It is said not to be attacked by insects, like the ash, or the lime. It is suggested that as a good starch may be extracted from the fruit, parishes might derive considerable profit by cultivating this tree, one of the handsomest in Europe, along the sides of the roads, walks, and in public places.—*Ibid.*

SUBMARINE CABLES.

A numerous meeting of engineers was held at the Town Hall, Manchester, on Wednesday morning, Oct. 21, to receive from Mr. John De la Haye (of the firm of De la Haye and Bloom) an explanation of a new invention, for which he had taken out a patent, for submerging submarine electric cables. Mr. Richard Roberts presided; and Mr. De la Haye said his attention had been drawn to the subject by the failures in laying the Mediterranean and Atlantic telegraph cables. The plan he would adopt would be to encase a cable, prepared like that for the Atlantic Ocean, in a soluble compound (the composition of which he would not now mention), capable of floating it for a time on the surface of the water. The coating he proposed to use for this purpose, he supposed, would hold it on the surface of the waves whilst about five miles of cable were paid out from the vessel, before it began to dissolve; and as it would dissolve gradually, so the cable would sink gradually to the bed of the ocean. By this means, he calculated that there would always be about five miles of cable lying on the surface of the water in the wake of the vessel, and the remainder would describe an incline to within one or two hundred feet of the bed of the ocean, so that there would be comparatively little strain, and consequently less liability of breakage. The cable would descend into the ocean almost horizontally, instead of nearly perpendicularly.—*Ibid.*

TARAXACUM *NOT* A SOURCE OF FALLACY IN TESTING FOR MORPHINE.

TO THE EDITOR OF THE MEDICAL TIMES AND GAZETTE.

Sir,—My report of the late inquest at Dagenham, and of the chemical points raised by Dr. Letheby's evidence given upon that occasion, having passed unnoticed by him, I forwarded to Dr. A. S. Taylor a portion of the taraxacum employed by Mr. Macarthy in dispensing the medicine for the deceased.

The following is Dr. Taylor's account of the result of his analysis:—

"*Sept.* 24*th*, 1857.

"Dear Sir,—In conjunction with Mr. Scanlan, a gentleman well versed in pharmaceutical chemistry, I have made a qualitative analysis of the sample of extract of taraxacum which you forwarded to me. We employed about twenty grains: there was not the slightest trace of meconic acid, in the absence of which opium cannot be said to be present; and there was no evidence of the presence of morphia, nor of any substance which, under reasonable precautions, could be mistaken for it.

"It contains the dandelion bitter, or taraxacin, resin, sugar, and tannic acid.

"The aqueous infusion or decoction acquires a bright reddish colour on the addition of nitric acid; and in this respect only it bears a remote resemblance to an infusion of opium. The numerous fallacies to which this mode of testing is exposed

—generally well known to, and recognized by, Chemists—as well as the entire absence of the smallest trace of meconic acid, preclude the possibility of mistake when a careful analysis is made. For this reason, we do not agree in the statement that taraxacum, or any substance contained in it, presents a source of fallacy in testing for opium or morphia.

"I need hardly say that if twenty grains of this extract present nothing which can be mistaken for the constituents of opium, it is not at all probable that a smaller quantity would present any fallacy; and in answer to your question, I have to say that I do not believe this quantity of the extract, or any portion of it, would be likely to remain in the stomach for a period of twenty hours.

"I am, &c.,

"*N. Davey, Esq.*" "ALFRED S. TAYLOR.

(Dr. Taylor has since informed me that he has examined another sample of extract of taraxacum obtained from a respectable Druggist in his neighbourhood: the results were similar.)

This letter is quite conclusive as to the principal point at issue, and establishes that taraxacum is not a source of fallacy in a carefully-conducted analysis.

It is difficult to imagine a more unsatisfactory case than this.

I am, &c.,

NORRIS F. DAVEY.

THE SALE OF POISONS BILL.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—There have been so many conflicting opinions put forward on the above subject from time to time, both in the medical and other journals, that I am induced to offer a few words, which may possess some value in the eyes of your readers as propounding the opinion of one who belongs to neither profession nor party concerned, and who has no interest in the question itself beyond that which each member of the thinking public must feel in a matter which is so closely and so constantly allied to life or death. The great war-cry of the Pharmaceutists against legislation* is, I think, ill-judged, and their arguments unwise; indeed, they seem to take a very short-sighted view of the entire question. In the first place, they hold up the education of Chemists as the *only* thing needful to secure public safety. Education is an excellent thing, and far be it from me to undervalue it in any degree on its own account, but it cannot do impossibilities; it possesses no magical means of operation, on the contrary, it is a slow process, and whilst the rising race of Druggists are working their way up by studying for a certificate, a thousand lives may be sacrificed to the prevailing ignorance.

The Pharmaceutical Society has done much to raise the status of Chemists, it may do much more by helping, instead of hindering, the extermination of their low-class brethren. This must be done, if it is to be done effectually, by the vigorous hand of the law. Numerous grocer-druggists are now permitted to pursue a trade in heterogeneous articles, partaking much more of the character of *general shops* than is at all compatible with the public safety, or with the standard which the true Chemist wishes to raise for himself. As long as the *free trade* in poisons is allowed to go on unchecked, accidents will continue to happen. With these proposed regulations the Pharmaceutists would thrive proportionably, for although the sale of a few poisonous drugs might be limited by being placed under restriction through a legal enactment, the change on the whole, as far as the Pharmaceutists are concerned (which we have just seen), would certainly be for their benefit. I must reserve to a future occasion some remarks on some other points of the question.

I am, Sir, yours truly,

October 21*st*, 1857. M. A. B.

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* The assertion that Pharmaceutists are opposed to legislation is an unfounded calumny. The Pharmaceutical Society has always been earnest in exposing the defective state of the law, and advocating an improvement. See page 249.—ED.

ARMY DISPENSERS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—As I am receiving numerous letters from gentlemen desiring to be appointed to serve in the Army as Dispensers of Medicine, and as some of them actually state that they have applied in consequence of some observation that has been made by you in your notice to Correspondents, I shall feel obliged if you will signify that gentlemen of the above-mentioned occupations are not wanted in this department, and that none need apply unless it be publicly announced that they are required.

I am, Sir, your most obedient Servant,

Army Medical Department,
5th October, 1857.

A. SMITH,
Director-General.

ACCIDENTAL POISONING BY TINCTURE OF ACONITE.

A CASE of accidental poisoning occurred at Durham, on Monday, Sept. 28, resulting in the death of Mary Ann, wife of Dr. Trotter, an eminent physician of that town. An inquest for the purpose of inquiring into the cause of the death of the deceased was held on Thursday, Oct. 1, at the Dun Cow Inn, before J. M. Favell, Esq., and, from the evidence adduced, it appears that Mrs. Trotter for some time past had been suffering from the tic doloureux, and during some conversation Dr. Trotter had upon the subject with Mr. Robson, surgeon, of the North Bailey, the latter recommended a liniment containing tincture of aconite ; Dr. Trotter mentioning at the time his dislike to aconite in consequence of his wife, some years ago, having nearly taken it through mistake for some other medicine. He, however, had the liniment made up by Mr. Trueman, chemist ; it was carefully labelled " for external application " in one colour, and " poison " in another colour. It was applied to the face of Mrs. Trotter, but as it did not produce the desired effect, Dr. Trotter went on Sunday, September 27, to Mr. Robson's surgery to get some tincture of henbane for her. Mr. Robson was in the surgery at the time, and states positively that Dr. Trotter asked for tincture of aconite, which he took from a bottle of tincture of aconite which was tied over with leather and kept behind a row of bottles for security. Dr. Trotter, on the other hand, asserts as positively that he asked for henbane. Thirty drops of the tincture were administered in a little water about twenty minutes to eleven, which produced sickness. She, however, fell asleep, and at night, feeling better, Dr. Trotter directed his daughter to administer thirty-five drops of the tincture in a little water, with soda and sal volatile (thirty drops only, however, were given). This speedily brought on increased sickness, and led the deceased to remark that she wondered if any mistake had arisen on the part of Mr. Robson. Dr. Trotter went and called up Mr. Robson, and on asking him what he had given him in the morning, he replied, " tincture of aconite." On Dr. Trotter returning home, ammonia and brandy were administered, but without effect, and Mrs. Trotter expired shortly afterwards. The jury returned the following verdict:— " That the deceased came to her death by a dose of aconite administered by mistake, but how the mistake occurred there is no evidence to show."

It is rather remarkable that care appears to have been shown in keeping the tincture of aconite by placing it behind a row of bottles, and yet in dispensing the same it was sent out *without any label whatever*. The strength of the tincture could not be that of the Pharmacopœia to require two doses of thirty drops each to prove fatal.

BOOKS RECEIVED.

REPORT OF THE TRIAL OF MADELEINE SMITH BEFORE THE HIGH COURT OF JUSTICIARY AT EDINBURGH, JUNE 30 TO JULY 9, 1857, FOR THE ALLEGED POISONING OF PIERRE EMILE L'ANGELIER. By ALEXANDER FORBES IRVINE, Advocate. Edinburgh: T. and T. Clark, George Street. Glasgow: Smith and Son. Aberdeen: Wyllie and Son. London: Stevens and Norton, and Simpkin and Co., 1857. 8vo, pp. 307.

ON THE RECIPROCAL ACTION OF METALS AND THE CONSTITUENTS OF WELL AND RIVER WATERS. By HENRY MEDLOCK, Esq. (From the *Philosophical Magazine* for Sept. 1857.) (From the Author.)

REPORT OF THE CHEMICAL INVESTIGATIONS RELATING TO METROPOLITAN DRAINAGE. By A. W. HOFMANN, LL.D., F.R.S., and H. M. WITT, F.C.S., 1857. (From the Authors.)

A SERIES OF ANALYTICAL TABLES; *forming a Complete Compendium of Directions for Work in the Laboratory.* By FREDERICK W. GRIFFIN, Ph.D., Director of the Bristol School of Chemistry.

These Tables are six in number, and are placed on thick millboard and varnished; the object being that several students may be using them without loss of time.

Dr. Griffin states that the greater part was in type before the appearance of Dr. Normandy's work.

TO CORRESPONDENTS.

H. G. Y. (Wakefield).—*Amalgams for Stopping Teeth.* Vol. ix., page 402.

A. C. E. (Leicester).—Excess of ammonia would precipitate bichloride of mercury from solution as *white precipitate;* lime water throws down a yellow precipitate.

S. (Hastings).—"Sodæ carbonas" is often ordered in prescriptions when the *bicarbonate* is intended.

D. (Birmingham).—(1.) *The Examinations.* See the August number of this Journal, page 105.—(2.) Balfour's *Manual of Botany.*

A. M. R. (Edinburgh).—The use of methylated spirit of wine in making tinctures is not justifiable.

A Member (Manchester).—(1.) Calcined stags' horns. Prepared chalk is generally substituted in plate powder.—(2.) Hooper's *Medical Dictionary.*—(3.) Bolley and Paul's *Manual of Technical Analysis.*

Z. L.—(1.) Noad's *Manual of Electricity.*—(2.) Gregory's *Outlines of Chemistry.*—(3.) We are unable to give the information.

W. C. H. (Halifax).—The *Pharmaceutical Latin Grammar* and the *Latin Pharmacopœia.*

A Registered Apprentice (Gloucestershire).—*Induction Coils.* See *Pharmaceutical Journal* for July, page 33.

B. J. (Pontypridd).—(1.) Ainsworth's *Latin Dictionary*, by Carey, 12*s.*—(2.) Turner's *Elements of Chemistry* is out of print.

A. B. C. (Leicester.)—Bowman's *Introduction to Chemistry.*

M. P. S. (Leeds).—The label alluded to is liable to stamp duty, as a secret proprietary nostrum.

An Apprentice (Glossop), on becoming an Associate of the Pharmaceutical Society, would be entitled to the Journal.

Mr. Hackman suggests that the Members of the Pharmaceutical Society should contribute 5*s.* each to the Mutiny Fund in India. He calculates that 2200 subscriptions of 5*s.* would amount to £550. We regret that our experience does not justify the sanguine hopes of our correspondent.

E. (Exeter).—See Dr. Smith's letter in this number, page 295.

O. M.—Dr. Locock's Lotion. Rub down the oil of mace; add gradually the oil of almonds and ammonia, previously made into an emulsion; add the rose-water gradually; lastly, the spirit of rosemary, which latter is the cause of the separation. An equivalent quantity of oil of rosemary does not cause this result.

A. (London).—In the preparation of *Conia*, a soft alcoholic extract of conium, prepared from the seeds, is distilled with its own weight of distilled water and a little caustic potash.

ERRATA.

In the Committee on the Adjudication of the Prizes, add the name of Mr. Squire.

The erratum last month (page 248) was unnecessary. The proposal for the prize in the previous year occurred in May; consequently the time was from May, 1856, to August, 1857. In the present year, the renewal of the competition was delayed until August; and the original statement, that the period was from August, 1857, to August, 1858, was correct.

Instructions from Members and Associates, respecting the transmission of the Journal, to the Secretary, 17, Bloomsbury Square, before the 20th of the month.

Advertisements (not later than the 23rd) to Mr. CHURCHILL, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XVII.—No. VI.—DECEMBER 1st, 1857.

PROFESSIONAL COURTESY AND RESPONSIBILITY.

It is usually understood that there are certain conventionalities which, although neither enforced by law nor defined in any Act of Parliament, constitute nevertheless the framework upon which Society is held together. Each class of Society is bound by its own regulations—a violation of which entails upon the delinquent a loss of caste or character. Officious interference with a fellow tradesman, unfair criticism of his skill or workmanship, and the endeavour to supplant him by underhand artifice, would be considered "untradesmanlike" and disreputable: and, although in the height of competition such feelings of delicacy are sometimes thrown aside, those who transact their business in this manner do not rank as first class tradesmen.

Among professional men, a higher standard of ethics prevails, and the term "unprofessional" (corresponding with "untradesmanlike" in the other case) is employed to designate conduct held to be unworthy of the members of the class, and inconsistent with the conventional regulations under which their position in society is maintained.

Differences of opinion may exist between professional men, and controversies may be warmly carried on among themselves, in support of the respective views of the several parties. On the arena of science or philosophy, all meet on equal ground. The avowed object of all being the establishment of truth, no reserve or deference is necessary in the argument, provided always that due courtesy of manner and expression is observed.

But in the mutual relation subsisting between a professional man and his client or patient, the case is different. In the medical profession, for example, it is against the rule to interfere with a case which is under treatment, unless in consultation with the practitioner in attendance. It is also contrary to etiquette to prescribe or give a professional opinion without seeing the patient, or receiving from the medical attendant a detailed statement upon which a judgment on any point in question might be formed. Chemists are frequently called as witnesses on opposite sides at inquests and in courts of law. It may be difficult on such occasions to avoid the partiality of partisans, yet the course of duty is clear: it consists in a plain statement of facts divested of sophistry and personalities. The professional character of the chemical witness is not at stake in the result of the trial; he is not responsible for the innocence or guilt of the party for or against whom he may have been retained; but he is responsible for the accuracy of his own experiments, and the results reported by him in his evidence. In the endeavour to trip up a witness on the other side, he may entangle himself; and by unworthy disputes arising in this manner the ends of justice are likely to be defeated.

When the conduct of a professional man becomes a subject of public investigation, it is, of course, the duty of those who may be called as witnesses to answer without favour or affection, and at the same time without asperity or prejudice, such questions as may arise. In a case quoted in the *Observer* of Nov. 8th from the *West Sussex Gazette*, a medical man was found guilty of manslaughter by a coroner's jury, for gross misconduct and neglect in the treatment of a patient in labour, who died in consequence. Medical witnesses were called,

who, having made a *post-mortem* examination, proved by their evidence that the circumstances of the case were not calculated to lead to a fatal result if proper skill and attention had been exercised. The accused party, having absconded, was apprehended on the coroner's warrant the same evening, and lodged in Winchester Gaol. To a man of proper feeling, it must be no very agreeable task to appear as a witness against one of his professional brethren; yet when called upon to give evidence on the facts under such circumstances, private feelings must give place to public duty.

In the case of Mr. Stafford, reported in another part of this number, we could not but admire the delicacy and caution with which Sir Henry Marsh and the other medical witnesses gave their evidence. While admitting the unusual amount of the dose of opium, which nothing but extreme urgency could have justified, they declined the responsibility of a positive opinion as to the degree of urgency, observing that a correct judgment could not be formed in such a case without seeing the patient at the time. That the dose was unusual and excessive could not be denied; but whether justified by the symptoms or not was a question in which the benefit of a doubt was thrown into the scale on the side of the medical practitioner.

If we compare the *animus* of the professional men in this case with that displayed in the strychnia and morphia controversy, the contrast is rather striking. Dr. Letheby having reported the presence of morphia, equivalent to one grain of opium in a certain portion of the contents of a stomach (see our number for October, page 243), had occasion to reverse his decision, which he explained by the announcement of the discovery that taraxacum produces similar reactions, and is therefore a source of fallacy in testing for morphia. Some of the taraxacum which had been used in the prescription was forwarded to Dr. Taylor, who, assisted by Mr. Scanlan, performed an analysis, and reported in a letter to Mr. Davey (published in our last number, page 293) that the reactions are different, and that consequently the "fallacy" discovered by Dr. Letheby does not exist. In this dilemma it might have been supposed that Dr. Letheby would have taken one of the two obvious courses, namely, that he would either have proved himself right or acknowledged his error, and expressed regret. If right, he would have had the credit of making a remarkable discovery, if otherwise, the moral courage of avowing the truth would have entitled him to respect and sympathy. But instead of attempting an answer to Dr. Taylor, he commences a personal attack in the form of two letters in the *Lancet*, taking as his text the question, "Why was it that Dr. Taylor did not discover strychnia in the dead body of Cooke?"

In the first of these letters (*Lancet*, Nov. 14, page 506) he observes that "it is but the trick of a special pleader, and of a man who is conscious of error and of a weak cause, to try to draw the reader away from the main question, by a discourse upon other matters."

The main question was, "Why did Dr. Letheby discover morphia in the dead body of Mrs. A. G.?" The answer of Dr. Letheby to this question is, "Why was it that Dr. Taylor did not discover strychnia in the dead body of Cooke?"

In his second letter (*Lancet*, Nov. 21), Dr. Letheby repeats his text, and returns to the charge with renewed vigour; it being the undisguised object of his arguments to prove the incompetence of Dr. Taylor to detect strychnia when it is present, while he makes no allusion to his own talent for detecting morphia when it is not present.

What might be the fate of an accused or suspected person, if his life depended on the doubtful reaction of a chemical test? and to what level would the profession be degraded, if its members were habitually to disregard the usual courtesy of society, and assail each other with personal abuse?

THE DENTAL PROFESSION.

In our reports of the proceedings of the Dentists last year, we took occasion to notice the endeavour to unite all the members of the dental profession into one body, by the formation of two distinct institutions, each claiming and professing to be that body. It has been observed by some of the parties concerned, that this division into two sections was necessary in the first instance; in other words, that it was necessary to establish the duality of the profession as a preliminary step towards its ultimate union on a solid foundation. Considering the elements of which the profession was composed, the disparity in the position, habits, and notions of its scattered members, and the absence of any previous bond of sympathy among them, it may readily be imagined that the endeavour to make extremes meet, and so to effect a complete amalgamation, would be attended with much practical difficulty. It was natural that the leading members of the profession, nearly all of whom were connected with the College of Surgeons either by membership or by habits of association, should entertain a favourable impression with regard to the diploma of that College as an object of ambition, and as the avenue to the rank of a Surgeon-Dentist. It was equally natural that those who happened to be on the other side of the Rubicon, and whose attention had been directed rather to the mechanism of dentistry than to the surgical department, should feel less ambitious of becoming what they considered to be a fungoid excrescence on the College of Surgeons, preferring a separate and independent existence. And so it was. The Odontological Society was founded with a view of introducing a dental qualification under the auspices of the College of Surgeons. The College of Dentists, taking independent ground, aimed at the introduction and recognition of its own diploma, representing a qualification in dental practice.

It has been rumoured that a disposition has lately prevailed to bring about the amalgamation of the two institutions, and it has been currently stated that the College of Dentists had modified their original views, and become reconciled to the proposed co-operation with the College of Surgeons. This, however, has been contradicted by a member of the Council of the College of Dentists, from whose statement it appears that the members are not ripe for such amalgamation, and that the notion of maintaining a distinct dental diploma, emanating from their own College, is still prevalent. The value of a diploma depends greatly on the authority and standing of the body from which it is obtained; and if the supporters of the College of Dentists should persevere in their laudable efforts until their institution has acquired a time-honoured and well-earned fame, its diploma will be sought with proportionate eagerness. In the mean time the Odontological Society may, if seconded and assisted by the College of Surgeons, establish at once a grade of Surgeon-Dentists on principles calculated to conciliate all parties, by the proper combination of the mechanism with the science of the profession, and the constitution of an appropriate Board of Examiners.

Whatever may be the ultimate result of the proceedings, the two Societies are aiming at the same object, which is the improvement of the Dental Profession, and its establishment on a permanent and creditable foundation. The emulation which may be supposed to exist between the two Institutions is likely to stimulate both, and if the union should ever take place, the benefit will be mutual.

The establishment of dental dispensaries for the benefit of the poor is an indication of activity in the profession. Mr. C. J. Fox, assisted by Mr. Statham, established one about two years ago, where 1085 patients have already been gratuitously relieved. It is situated at 476, New Oxford Street. Mr. Tomes is Consulting Dentist to the Dispensary.

We understand that the establishment of similar institutions in other localities is in contemplation.

LEGISLATION AGAINST POISONING.

A PRELIMINARY discussion on this subject will take place at the Pharmaceutical Meeting at 17, Bloomsbury Square, on Wednesday evening, the 2nd of December, when the provisions of the Sale of Poisons Bill will be considered.

It is the object of the discussion to submit the theoretical propositions emanating from a high source, to the test of the practical experience of the Members of the Pharmaceutical Society. With a view of furthering this object, the following circular has been issued to all the Members:—

17, *Bloomsbury Square, London, November*, 1857.

SIR,—The Committee appointed by the Council to consider the provisions of the "Sale of Poisons Bill" request the favour of answers, as early as may be convenient, to the following questions, the object of which is to obtain statistical information as to the real or principal sources of danger in the sale of Poisons, and also to prevent improper or injurious interference with the legitimate wants of the public by any measure which may be brought into Parliament on the subject.

N.B.—The names of parties furnishing answers to these questions will be considered confidential.

Yours obediently,

ELIAS BREMRIDGE, *Secretary.*

The following articles constitute the "Schedule of POISONS" in the proposed amended "Sale of Poisons Bill:"—

1. Do you sell by retail all or any of them?—Arsenic, and its Compounds—Corrosive Sublimate, and its Solution—The Poisonous Vegetable Alkaloids, and their Salts—Prussic Acid—Cyanide of Potassium—Essential Oil of Bitter Almonds, or any mixture containing it—Cantharides—Aconite, and its Preparations—Opium, crude or in tincture, extract or powder—Chloroform—Oxalic Acid and Salts of Sorrel—Nux Vomica—Tartarized Antimony, and its Solution—Cocculus Indicus.
2. Is any one or more of the above Poisons in great demand in your neighbourhood; and if so, which?
3. Can you give an idea of the nature and extent of such demand; that is to say, the purposes for which the said articles are required, the class of persons using them, whether in large or small quantities, frequently or otherwise?
4. Are there any other Poisons in regular demand in your neighbourhood, requiring as much precaution in their sale and use as those above enumerated: if so, please to name them?
5. Do you, in the ordinary exercise of your discretion, frequently refuse to sell Poisons; and has it come to your knowledge that accidents or crimes have been prevented by such precautions?
6. If any cases of accidental or criminal poisoning have occurred in your neighbourhood, can you state which Poison or Poisons have most frequently been the cause, and whether arising from carelessness or ignorance in the vendor or purchaser?
7. Are drugs, including Poisons, sold to any great extent by Grocers, Chandlers, and other persons not Pharmaceutical Chemists or regularly educated Chemists and Druggists, in your neighbourhood?
8. What proportion, in round numbers, do the former bear to the latter?
9. Have you read the "Sale of Poisons Bill," which was published in the *Pharmaceutical Journal*, Vol. xvii., No. 3; and do you think its provisions practicable and judicious?
10. Have you any suggestions to offer on the subject?

When sufficient time has been allowed for the Members to furnish answers to these questions, the Council will carefully consider and arrange the statistical information so received. The result will be submitted to a future meeting of the Members, with such suggestions as to the Council may appear desirable.

TRANSACTIONS

OF

THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *4th November*, 1857,

Present—Messrs. Bell, Bird, Ballard, Bucklee, Deane, Keeling, Meggeson, Moore, Morson, Peacock, Sandford, Squire, Waugh, and Woolley, the following was elected a

MEMBER.

WATFORD.....Maries, Henry Davies

MAJOR EXAMINATION, *November 17th.*

Banner, Samuel .....Liverpool
Michell, Frederic.....St. Austell

MINOR EXAMINATION.

Berger, Volcy .....Clapham
Boucher, John.....Belper

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	ADDRESS.
Argles, Robert	Mr. Deane	Clapham
Eve, Charles	Mr. Wilson	Holloway
Hatchard, Stephen	Mr. Huggins	Alresford
Heald, Alfred John	Mr. Barley	Wisbeach
Pearson, George Brigg	Mr. Kay	Leeds
Swinnerton, William	Mr. Woods	Worcester
Seaton, Charles Abdiel	Mr. Hill	Sherborne

PHARMACEUTICAL MEETING,

Wednesday, November 4th, 1857.

MR. JACOB BELL, PRESIDENT, IN THE CHAIR.

THE following Donations to the Library and Museum were announced:—

Journal of the Photographic Society, from the Society.
Journal of the Society of Arts, from the Society.
Compte Rendu de la Pharmacie Centrale de France.
Bulletin de la Société Botanique de France.
Specimens of Sulphur and Scoria from Mount Vesuvius, and saltpetre made from the scoria, presented by Mr. Peacock.

PRIZES FOR HERBARIA.

The Prizes and Certificates of Merit which had been awarded for Herbaria, as announced at the previous meeting, were distributed by the Chairman, as follows:—

Thomas Fleetwood, Stratford-on-Avon .....SILVER MEDAL
John Ereaut, Jersey .....BRONZE MEDAL
William Henry Brown, North Shields .....FIRST CERTIFICATE
R. B. Tollinton, Stowmarket .....SECOND CERTIFICATE
James Green, Bath.....THIRD CERTIFICATE

The following paper was read:—

DISCREPANCIES IN PHARMACOPŒIAL DOSES.

BY MR. INCE.

It has been suggested to me that, in the Translation of the Pharmacopœia by Mr. Phillips, a considerable discrepancy exists between the doses mentioned in the body of the work, and those indicated in the Posological Table at the end. Were this difference found only to occur in the case of remedies of secondary or no importance, the subject would scarcely claim investigation. It is obvious that the dose of simple decoctions or infusions might be allowed to vary without any material consequence ensuing; but the discrepancy here hinted at, is most observable in those preparations which are usually considered most important. For this I accounted in three ways:—

1st. That the Posological Table in the new Pharmacopœia of 1851 was a literal copy of the old list of 1836, and that therefore the doses differed; but on examination this cannot be, since many new remedies, such as Liquor Morphiæ Acetatis, Tinctura Aconiti, Tinctura Quinæ Composita, &c., are inserted, whilst others are omitted.

2nd. That the concluding Posological Table gave the maximum and minimum doses of the various articles; but this is not the case, for the dose of that popular remedy, Sweet Spirit of Nitre, is there stated to be ℥x. — ℥xl., while in the centre of the book we find it ʒss. — ʒij. In the same manner it assigns as the dose of Tinctura Quinæ Composita, ʒj. — ʒiv., instead of ʒij. — ℥j.

3rd. That the maximum and minimum dose was quoted after each formula, and not in the Posological Table; but neither is this view correct, for we find the dose of the Ammonio Citrate of Iron to be gr. iij. — ℈j. in the Posological Table, and only gr. v. — gr. x. under the article Ferri Ammonio Citras.

The dose of two most important solutions, Liquor Morphiæ Acetatis and Liquor Morphiæ Hydrochloratis, is given in the Posological Table, ℥ij. — ʒj., and at the conclusion of the respective notices, ℥vj. — ℥xv.

Whatever explanation may be offered, it is certain that a remarkable discrepancy does exist between the doses of Pharmacopœial preparations, as described in the same volume. Here is a table, as a specimen of some of the most striking instances:—

The dose appended to the Formula being the maximum.

PREPARATIONS.	DOSE appended to Formula.	DOSE from Posological Table.
Acet. Colchici	ʒss. to ʒij.	ʒss. to ʒj.
Sp. Æther. Nitric.	ʒss. — ʒij.	℥x. — ℥xl.
Liq. Ammon. Acetatis...	ʒiij. — ℥j.	ʒiv. — ʒvj.
Dec. Scoparii Comp.....	℥j. — ℥iv.	℥j. — ℥iss.
Ext. Aloës	gr. v. — gr. xv.	gr. j. — gr. x.
" Lactucæ.....	gr. v. — gr. xx.	gr. v. — gr. x.
" Taraxaci	gr. x. — ʒj.	gr. x. — ℈j.
Cupri Sulph. (Emetic)...	gr. viij. — gr. xv.	gr. ij. — gr. x.
Vin. Ferri	ʒj. — ℥ss.	ʒss. — ʒij.
Pil. Aloës c. Myrrhâ.....	gr. v. — gr. xxx.	gr. x. — ℈j.
" Aloës c. Sapone	gr. v. — gr. xv.	gr. ij. — gr. x.
Oleum Ricini.....	ʒss. — ℥ij.	ʒiv. — ℥iss.
Sp. Ammon. Fœtid.	ʒss. — ʒj.	℥xv. — ʒss.
Tr. Aconiti.....	℥ij. — ℥x.	℥j. — ℥vj.
" Quinæ Comp.	ʒij. — ℥j.	ʒj. — ʒiv.

The dose in the Posological Table being the maximum.

PREPARATIONS.	DOSE appended to Formula.	DOSE from Posological Table.
Liq. Ammon. Sesquicarb. ...	ℿxxx. to ℿxl.	ʒss. to ʒj.
Liquores, Morph. Acetatis et Morph. Hydroch.....	ℿvj. — ℿxv.	ℿij. — ʒj.
Ext. Elaterii	gr. $\frac{1}{16}$ — gr. ij.	gr. ss. — gr. ij.
Liquor Arsenici Chloridi ...	ℿiij. — ℿx.	ℿiij. — ℿxx.
Syrup. Ferri Iodidi.....	ℿx. — ℿxxx.	ℿx. — ʒj.
Ferri Ammonio-Citras	gr. v. — gr. x.	gr. iij. — ℈j.
Sp. Juniperi Comp.	ʒij. — ʒiv.	ʒiij. — ℥j.
Tr. Colchici Comp.....	ℿxx. — ℿxxx.	ʒss. — ʒj.
" Gallæ.....	ℿxx. — ʒij.	ʒj. — ʒij.
" Lobeliæ	ℿx. — ℿxxx.	ʒss. — ʒj.
" Opii	ℿx. — ℿxl.	ℿx. — ʒj.

In some cases, also, a dose is given in the Posological Table of a substance which does not exist in the Pharmacopœia. Thus, the dose of Extractum Sarzæ is stated to be ℈j. ʒj. On reference, no such preparation seems to be included. The Extractum Sarzæ Liquidum, which probably supplies its place, has a dose of fʒj. to fʒiij. in the work itself, and none whatever in the Posological Table. This is curious, but otherwise is of not much practical consequence.

Lastly. The dose of the Infusum Cinchonæ Spissatum, which is given only in the Posological Table, is ℿxx. ℥ss. One ounce of this concentrated infusion is said to equal from ℥xxiv. ℥xxxvj. of the ordinary infusion, making the dose of Infusum Cinchonæ ℥iss. ℥xviij., which, in the same Posological Table, is given as ℥j. ℥iij. So that not merely does a discrepancy exist between the Posological Table and the Pharmacopœial description, but also, in some instances, the former is at variance with itself.

I am aware that what is called Phillips's Pharmacopœia is not the authority. It is *a* translation of the authority. Nevertheless, it is the book with which students are expected to be familiar before they present themselves for an examination. The question is, when a student comes to learn his doses, which Posological Table should he follow?

The Chairman said it was certainly desirable to have a correct posological table attached to the Pharmacopœia, which could be referred to as an authority in cases of doubt; but it must not be forgotten, with reference to Phillips's translation of the Pharmacopœia, that the College of Physicians were not responsible for that part of the work, and that Mr. Phillips himself had died before the work was completed. The inconsistencies referred to by Mr. Ince were much to be regretted.

The Chairman then reverted to a subject which had been briefly noticed at the end of the last Meeting, namely—

THE USE OF METHYLATED SPIRIT IN PHARMACEUTICAL PREPARATIONS.

The Council considered the present aspect of the question at issue very unsatisfactory, for while a difference of opinion existed as to the purposes for which methylated spirit might properly be used, the inevitable result of this uncertainty was an unfair and injurious competition, tending seriously to deteriorate the quality of many pharmaceutical preparations. It being one of the leading objects of the Society to raise the standard of Pharmacy in this country, and to discountenance adulteration and objectionable practices in the manipulation of medicines, it was a proper and legitimate subject for them to discuss;

and the opinion of the Society, after such discussion, would be entitled to some weight. With a view of arriving at a clear understanding as to the state of the law on the subject, he (the Chairman) had, since the last meeting, applied personally to the Board of Inland Revenue at Somerset House, and had an interview with the Secretary. He was informed that the Board advisedly granted permission to use methylated spirit in pharmaceutical preparations; but did not pretend to discriminate between one preparation and another with reference to their medicinal properties or efficacy. It was the province of the Board to protect the revenue, and to take care that no pecuniary loss was sustained by any evasion or misconstruction of the terms of the Act; but it was for the Medical Profession to decide in what cases the methylated spirit might be used without injuring the quality of the medicines. So far as the revenue was concerned, there was reason to believe that the experiment had fully answered the purpose for which it had been tried. So greatly had the traffic in illicit spirit in London, and in fact in the country generally, diminished since the introduction of methylated spirit, that it might almost be considered as suppressed. Half the staff of detective officers had been discharged, and the dismissal would have been carried further, but it was thought prudent to retain, by way of prevention, a sufficient force to check any possible recurrence of the offence. The demand for methylated spirit did not appear to increase to any extent, as the quantity of naphtha used for that purpose last year was 17,000 gallons, while the quantity during the ten months of this year amounted to only 16,200. With regard to the preparations in which methylated spirit had been used, information could without doubt be obtained at Apothecaries' Hall, where certain medicines had been ordered, under the sanction of the Treasury, to be made with that spirit; but whether tinctures, extracts, or chemicals, whether for external or internal use, the Board of Inland Revenue did not inquire, as that part of the question was considered to be purely medical, and subject to the decision of the doctors. Upon receiving this information, he (the Chairman) had waited on Mr. Warington at Apothecaries' Hall, who stated that orders had been received from the Army Medical Board to prepare linimentum saponis, and certain other external preparations, with methylated spirit. In the first instance the authorities at the Hall had felt some objection, and intimated the same; but a peremptory order was sent from which there was no appeal, and an application was therefore made to the Board of Inland Revenue for the requisite supply of the methylated spirit. This, in the first instance, was refused, probably on account of some misunderstanding; but it was afterwards supplied, and the preparations made according to order. Mr. Warington said the Committee of Apothecaries' Hall was entirely opposed to the introduction of methylated spirit in tinctures and other pharmaceutical preparations, considering it unsuited to such purpose, and the contamination of alcohol with an empyreumatic wood naphtha being a deviation from the system of accuracy and purity which was in that establishment held to be essential in the preparation of medicines. It was obvious, therefore, that the authorities at Apothecaries' Hall were not responsible for the innovation, and he (Mr. Bell), thinking it desirable to refer the case to the Royal College of Physicians, had waited on Dr. Mayo, the President, to whom he had stated the facts, mentioning at the same time that the subject would be brought under the notice of a Meeting of the Society on that evening. The President at once acknowledged the importance of the question, and suggested that, in order to bring it officially before the College, a communication should be made in writing on behalf of the Society, describing concisely the predicament in which Pharmaceutical Chemists are placed by the new excise regulation, and requesting the instructions of the College thereon.

It was obvious that, according to the instructions of the Pharmacopœia, the use of methylated spirit for the purposes under consideration was altogether inadmissible; but the law authorizing the introduction of methylated spirit,

being of more recent date than the last edition of the Pharmacopœia, the question had been raised, whether the authority of the Government, in permitting the use of a substitute for ordinary rectified spirit, did not supersede the directions of the College, which were published prior to the granting of this permission. As it was admitted that methylated spirit might with propriety be used as a solvent in some chemical processes, it became necessary to draw the line between the class of cases to which it was intended to apply, and those in which it should be prohibited. It should be clearly understood whether the introduction of naphtha in medicine, taken internally, was justifiable or not. There was a manifest distinction between the employment of a menstruum, merely as a solvent for extracting an alkaloid or other vegetable principle, and its introduction unaltered into the stomach, as a constituent of a medicinal preparation. As they looked up to the College of Physicians for instructions on such questions, he thought the proper course would be to appeal to the College, with a statement of the facts of the case. If the meeting agreed in this opinion, he would undertake to make the needful communication to the President of the College on behalf of the Society.

Mr. Peacock thought there could be but one opinion with respect to the use of methylated spirit for the preparation of tinctures by Members of the Pharmaceutical Society. The favourable position they occupied was due to the efforts they had for many years made to improve the practice of Pharmacy. They had thus obtained increased confidence from the public, and it could not be supposed, that for the sake of cheapening some of their preparations, they would consent to lose this confidence. If Members of the Pharmaceutical Society took upon themselves to alter the mode of preparing an important class of remedies, the sole object being a reduction in the cost of their production, while no consideration was given to the medicinal properties of the preparations so obtained, they would be unworthy of the confidence of the public or of the Medical Profession. The use of tinctures made with methylated spirit in dispensing Physicians' prescriptions would be an act of dishonesty, and ought to be repudiated as such. It had been urged that the poor would be benefited by the introduction of methylated tinctures, as they would be cheaper than those made with pure spirit, but he thought it doubtful whether the result would not prove to be the same as had occurred on taking the duty off leather, the price of boots and shoes remaining unaltered. If tinctures made with methylated spirit were to be introduced as a new class of preparations, in addition to those made as directed in the Pharmacopœia, the whole system of the Druggist's business would be altered, much confusion would ensue, and a large increase in the number of bottles for keeping such preparations would be required. He hoped Pharmaceutical Chemists would set themselves decidedly against the use of methylated spirit for any such purpose.

Mr. Gibbs, although fully agreeing with what had been said against the use of methylated spirit in the preparation of medicines intended for internal use, thought the same objections would not apply to its use in the preparation of certain external applications, especially as the Government had sanctioned its employment for such purposes.

Mr. Redwood said the subject was one to which he had directed a good deal of attention, and he thought it important that it should be viewed in all its bearings before coming to a conclusion that would sanction the use of methylated spirit for the preparation of any medicine of which it would remain as a component part. Spirit was used in pharmacy both as a solvent and as a medium of administration. For the first of these purposes it was often employed, merely on account of its solvent power, to extract from drugs those parts which are soluble in spirit, and to separate these from the insoluble parts. There was no doubt that methylated spirit, viewed merely with reference to its solvent power, might be substituted for ordinary spirit of wine. The naphtha which it

contained possessed the same solvent power as the alcohol. It was true that the naphtha was often much contaminated with oils which contributed to its disagreeable smell, and which, being less volatile than the pure naphtha, were sometimes retained by resins and other bodies which had been extracted by means of methylated spirit after the spirit had been distilled off, but this objection was in a great measure, if not entirely, removed, by distilling the methylated spirit from a little caustic potash or soda before using it for such purpose. The question to be considered with reference to the use of methylated spirit simply as a solvent was this,—is the product thus obtained the same as would be obtained by the use of pure spirit? He thought there were many cases in which methylated spirit, as a mere solvent, could be unobjectionably used in pharmaceutical processes. No objection had been urged against the use of methylated spirit for this purpose. But then came the question, can methylated spirit be used in pharmacy as a medium of administration. When thus used, the spirit was applied, as well as the substances of which it was the solvent, either internally or externally. The suitability of the menstruum must depend upon its action on the animal economy, and probably it would be necessary to determine this more satisfactorily than had hitherto been done, by experiment, before the question could be definitively settled. Perhaps it would be conceded, in the existing state of knowledge, that methylated spirit might be used for external applications without the efficacy of such applications being materially affected. Perhaps even it would be conceded that for some internal remedies it might also be used without serious disadvantage. Still, it could not be denied that there were a great number of medicines the efficacy of which would be greatly injured by the substitution of methylated spirit for pure spirit in their preparation. Thus, while only a qualified opinion could be expressed in favour of the use of methylated spirit in any of the cases referred to, a decided opinion would be generally given to the effect that its use in most cases would be highly objectionable. Under these circumstances, was it right to sanction its use in any of the cases referred to—that is, for the preparation of medicines of which it would remain a component part? In considering this part of the subject, he had purposely abstained from referring to the duty of the Pharmaceutist to adhere strictly to the instructions of the Pharmacopœia in the preparation of medicines. He did not wish to limit the question, but to consider it as it might be considered by the College of Physicians. What motive could there be for the substitution of methylated spirit for pure spirit in the preparation of medicines? No one had ever suggested that methylated spirit was better than the other; indeed, all would admit that it was a less definable body, less uniform in its composition, and that its impurities were of a nauseous and, to a certain extent, deleterious nature. The only motive for the use of methylated spirit was that of rendering the product cheaper; and, he would ask, was this sufficient to justify its use, when it was considered how insignificant would be the saving in the cost of a dose of medicine, and how doubtful, to say the least of it, would be the effect of the substitution upon the efficacy of an intended remedy for some bodily ailment? He was decidedly of opinion that methylated spirit ought not to be used for the preparation of medicines of which it would remain a component part. If its use was admitted in any special cases, it would gradually come to be used in others; and thus, by admitting the thin end of the wedge, it would become a cause of scandal to the Pharmaceutical body and a source of embarrassment to the Medical Profession. He thought the Board of Inland Revenue had made a mistake in allowing methylated spirit to be used for making sweet spirit of nitre, and that the Government had committed a still greater error in sanctioning its use in medicines supplied to the army. He could not conceive upon what grounds Government required methylated spirit to be used in medicines supplied to them. It could not be on the ground of economy, for the increased price they would pay for medicines made with pure

spirit would be only equivalent to the duty they had already received on the spirit. He could only construe this act of the Government Board into an intentional sanction and encouragement of the use of methylated spirit. He thought the subject deserved the serious attention of the Pharmaceutical Society, and he trusted the agitation of it would not be allowed to subside until the questions at issue were satisfactorily disposed of.

Mr. Squire expressed his concurrence with what had just been said. He had not seen any tinctures made with methylated spirit before that evening,* but he considered all the samples before him to be very decidedly inferior to those made with pure spirit.

Mr. Woolley thought that before any steps were taken to urge the Board of Inland Revenue to prohibit the use of methylated spirit for the pharmaceutical purposes which had been referred to, it was desirable to ascertain how far the fears that were entertained of its injurious effects in certain cases were well founded. He considered the introduction of methylated spirit a great boon to manufacturers, and he hoped no unnecessary impediment would be thrown in the way of its application.

Several members expressed their opinions to the effect that it was the duty of the Pharmaceutical Chemist to follow the instructions of the Pharmacopœia, in making their tinctures and other preparations; and that so long as the College of Physicians continued to order pure spirit, it would be quite unjustifiable for them to substitute methylated spirit.

Mr. Francis observed that there had been a good deal said on the subject during the evening, but he hoped something would be done, and that speedily, to prevent the introduction of methylated tinctures as articles of commerce.

Mr. Morson thought the Society ought to be very careful how they interfered with the measures adopted by the Government for extending the use of methylated spirit. He considered the introduction of this spirit a great benefit to the manufacturer, but he did not defend its use in tinctures.

Mr. Williams having had occasion to use a good deal of methylated spirit, had observed that its vapour caused a smarting in the eyelids, which was not caused by the vapour of pure spirit, and he inferred from this that methylated spirit was more irritating to the skin than pure spirit. He thought this should be considered in deciding on its applicability for the preparation of liniments.

The Chairman thought the discussion that had taken place had pretty fully elicited the opinions entertained by those present, and he concluded that the meeting was favourable to the proposition he had made to submit the case to the College of Physicians for their decision.

PHYTOLOGICAL CLUB.

17, *Bloomsbury Square, Nov.* 11, 1857.

ROBERT BENTLEY, F.L.S., PRESIDENT, IN THE CHAIR.

Mr. L. Blyth exhibited a Locust recently caught in the neighbourhood of London, and also some specimens of Ergotized Grasses.

Mr. Bentley exhibited monstrosities of the flowers of *Scabiosa succisa*, the fruit of *Ecbalium officinarum*, and the flowers of the Rose, and made a communication thereon, which will be more particularly noticed in the next journal.

The next meeting of the Club will be held on Wednesday, December 9th, at half-past eight P.M.

Mr. S. W. Brooke has been elected a Member of the Club.

* There were some samples of tinctures made with methylated spirit on the table, which had been received from Liverpool.

PHARMACEUTICAL SOCIETY.

NORTH BRITISH BRANCH.

THE EXAMINATION IN SCOTLAND.

The Board of Examiners intend to meet in Edinburgh on Tuesday, 12th January, 1858, and any who propose to come forward for examination are requested to communicate with the Secretary before the 1st of January.

121, *George Street*, 13*th Nov.*, 1857. John Mackay, *Sec.*

The First Meeting of the present Session was held in the New Hall, 51, George Street, Edinburgh, on Friday evening, 13th Nov., at 9 o'clock P.M.,

MR. WILLIAM FLOCKART, PRESIDENT, IN THE CHAIR.

THE PRESIDENT'S ADDRESS.

It is customary for your President, at the commencement of the session, to make some remarks on the present state of the Society, and on what has been done during the vacation.

I should consider myself very neglectful of your interests, if I did not take the earliest opportunity of expressing our gratitude for the restoration to health of our indefatigable Secretary, Mr. John Mackay, and we trust he may be long spared to fill the office in which he has proved himself to be such a useful member. We are also glad to see our late President, Mr. Robertson, whose absence last winter through indisposition was regretted by all of us.

We have been obliged to remove from our former rooms, No. 50, George Street, on account of the proprietor converting the building into shops. This we do not regret, as the present commodious and handsome room will suit us much better; and besides, we have a better lighted room for the Museum and Library up-stairs; so that with increased and permanent accommodation, we trust Members will help forward the good cause, by contributing towards the establishment of a really good and useful Museum, where any person may examine the specimens, or spend a leisure hour in the Library. The rooms are open from 10 to 4 daily, and the key to the Museum and Library may be had from Mr. Ainslie, one of the Curators.

The Council regret that so few have competed for the Register Fund Prize, only one Essay having been given in, which the Council do not consider of sufficient merit to deserve the prize.

It is the intention of the Council to change the subject this winter, and to give out more than one for competition; as will be afterwards intimated by our Secretary.

We hope now to have a sufficient number of contributions from Members to enable us to keep up the interest of the scientific meetings.

Since our last meeting nothing of importance has occurred, except the Bill for the Sale of Poisons, which has been laid aside for the present. This subject has occupied much of our attention. It is very desirable to have a Bill that shall not interfere with the duties of the Dispensing Chemist, while at the same time the public safety shall be insured. All that is at present required to meet the public anxiety on this question, is an extension of the Bill for the Sale of Arsenic, so that it may embrace some of the poisonous alkaloids—such as strychnine, veratrine, aconitine; likewise prussic acid, Fleming's tincture of aconite, &c. But the preparations of opium and others, that are in daily use, ought not to be included. The sale of poisons should only be entrusted to persons who are properly qualified, and of full age. I consider this to be a very important clause.

Most of those now present who are in business can speak from the experience of twenty-five years (and some for a much longer period), and I am assured there has not been one fatal accident in any of our establishments during that space of time. That there have been some small mistakes, every one will admit; but it is a great fact, which ought not to be lost sight of, that so many millions of prescriptions have been dispensed with such accuracy and care during that time. The reason of this is obvious. Every means has been taken that human skill and ingenuity could devise, so that accidents might be prevented. Lotions and liniments are marked "for external use," and if they contain any poisonous ingredient, it is labelled in characters which none can misunderstand. This will answer much better in the long

run than three or four-sided bottles. Every dispenser who understands his business, knows the great responsibility attached to his duties, and is well aware that one fatal mistake is next thing to ruin.

If business has been conducted with such accuracy during the last twenty or thirty years, surely it is not too much to expect not only a continuance, but an improvement, under the influences of an improved education and the fostering care of the Pharmaceutical Society.

I think I have said enough to show that we do not at present require very strict legislation. If the suggestions I have made should be found after trial not to succeed, then more stringent measures might be adopted.

We are all much indebted to the Council in London for their exertions on our behalf. They had many difficulties to contend against, but with such men as Mr. Jacob Bell, our representative, Mr. Macfarlan, and the other Members of the Council, our interest and that of the public (for I hold them to be identical) shall not be overlooked.

There is another subject of very great importance to the Society, which the medical profession ere long may bring forward, and which is felt every day to be more and more necessary, that is, a "Universal Pharmacopœia for Great Britain."

In the present day, when railways have brought the three kingdoms so much into one, it is a pity to see them any longer divided by so many Pharmacopœias. We have all heard of the patient who was ordered by his Edinburgh physician to take forty drops of the solution of muriate of morphia at bedtime, but no sooner had he crossed the border, than he found to his astonishment that forty drops of the Carlisle Chemist's solution were equal to sixty of the Edinburgh Chemist. Again, on his return to Scotland, he finds that the two drops of prussic acid prescribed for him in London, when dispensed in Edinburgh was equal to three and a half drops of the London acid. There are a great many other preparations of less importance, but all of them equally annoying to the Dispensing Chemist.

These discrepancies ought not to exist in the same country, and although the Chemist does all he can to find out whether it is an English or Irish prescription he has got to dispense, there are many cases in which that cannot be ascertained.

We have heard lately about tinctures being prepared with methylated spirit in some parts of the country, but I was unwilling to believe that this was done in Edinburgh. A person having called the other day with a phial of laudanum, wished to know if it was correct, as it had a very disagreeable smell. Knowing where it had been procured, I sent and got an ounce, and find it has been prepared with methylated spirit. The Pharmacopœias direct that "the menstruum for all tinctures shall be made by diluting rectified spirit with distilled water." I could understand why hospitals should direct liniments to be prepared with methylated spirit, as it is only one-fourth of the price of pure rectified spirit, but I never expected that a retail Chemist would prepare tinctures for internal use with methylated spirit without labelling it as such.

My young friends, one word to you, and I have done. You have chosen a profession which requires much attention and study; it may not be so remunerative as some others, but it is an intellectual and honourable occupation, and one in which you may do much toward the relief of human suffering; and what study can be more interesting and extensive than that of Chemistry, Botany, Materia Medica, and Pharmacy?

At the close of his Address, the PRESIDENT handed round a sample of Laudanum made by a Druggist in Edinburgh and regularly sold. The feeling of the meeting was strongly condemnatory of such a preparation being recognized. The odour of naphtha was of course very predominant, and all appeared impressed with the desire to ignore any tincture for internal use thus prepared, on the grounds that such a proceeding was contrary to the formulæ of the Pharmacopœia, and the presence of naphtha considered a very great adulteration, and objectionable in every point of view.

Mr. MACFARLAN, at the request of the Chairman, gave a short account of the proceedings of the Council in London in regard to the "Poisons Bill," which he characterized as at once distinguished by sound judgment, great prudence, and untiring vigour. The House of Lords having nothing to do in the early part of the

season, had thought themselves equal to the task of regulating the sale of physic, and protecting the lives of the lieges from the danger of accidental poison. But they soon found themselves out of their element, and wisely availed themselves of the aid of the Council of the Pharmaceutical Society, and also received with great courtesy their brethren from Liverpool ; and in the end produced a Bill somewhat different, but still unworthy either of their Lordships' House, or of the confidence of the public. They had entirely given up the idea of protecting the lives of the lieges from death from railway accidents, though much more within the control of law than accidents from poison ; and that, partly because they were few. They were very terrible indeed when they did happen ; but they were very few, when compared to the numbers who travelled. But they were legion indeed compared with the number of those who were poisoned by accident. The Chairman had alluded to the smallness of their number. The number indeed was infinitesimably small ; certainly not one in several millions of times. Mr. M. referred to various laboratories in town, where for many long years, in the midst of active business—for twenty, thirty, forty, or even eighty years—no fatal accident had ever happened, though in myriads of cases poisonous substances had been dealt with. Still if any means can be advocated for lessening such accidents, he was sure they would be all most willing to receive them. But while their Lordships seemed freely to admit that none but those who were acquainted with poisons should handle them, they strangely enough proposed to commence by ignoring the very existence of the Pharmaceutical Society—thus, at one blow, excluding the greater part of the educated class of Chemists and Druggists. Nor did the Apothecaries' Company fare any better. None were to be allowed to deal in them but those licensed by a Government Board ! For their own sakes, and the sake of the public, they ought to protest against such an outrage on common sense as this. But he could assure them that the case was safe in the hands of the Council, which he could speak of with freedom, though a Member, as his residence in this city prevented him from taking an active part in their proceedings. To the Council, and especially to Mr. Bell, they owed a debt of gratitude for what they had done, and might look forward with confidence to the future ; and he would therefore propose merely that the Secretary be instructed to convey their thanks to the Council, and request that they would take such steps as might be needful in the coming session, to oppose the Bill now before the public, and to obtain, if legislation must be had, such a Bill as would afford the utmost amount of protection to the public compatible with the free and untrammelled exercise of their profession. He would also propose a vote of thanks to the President for his excellent Address.

This was seconded by Mr. Robertson, and unanimously agreed to.

[Dr. Macadam's paper had not arrived at the time of going to press.]

Some discussion took place on one or two of the points connected with Dr. Macadam's paper, in which Mr. D. R. Brown and Mr. Macfarlan took part. A vote of thanks was carried by acclamation to Dr. Macadam for his very interesting paper.

The Secretary then read the decision of the Council regarding the Register Fund Prize. Only one essay had been received, and that not possessing sufficient merit to entitle it to a reward. He further intimated that the Council had resolved to leave the selection of the subject for the Fund Prize for the present Session to the competitors themselves, with this understanding, that it be one intimately connected with Pharmacy. All papers to be sent to the Secretary on or before 1st March, 1858.

He also stated that, in addition to the above, the President's Prize would be awarded to the author of the best essay "On the Different Kinds of Manure." These papers in like manner to be sent to the Secretary on or before 20th March, 1858. In both cases, mottoes and sealed envelopes to accompany each essay as usual.

The arrangements for the Library, and some remarks upon the Museum, concluded the business of the evening.

The following gentlemen laid some specimens on the table, intended for the Museum:—Messrs. James Robertson, Duncan, Flockhart & Co., Dr. Macadam, Gardner & Ainslie, and John Mackay.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

Royal Institution, Thursday, 22nd Oct., 1857.

THE PRESIDENT, MR. H. S. EVANS, IN THE CHAIR.

Messrs. W. Johnson, A. E. Livsey, T. Simcock, W. H. Turner, J. Angior, W. W. Day, J. Pendlebury, J. Oliver, T. Banner, W. Tomlinson, C. Higgins, W. Blacklock, J. Moss, D. Gamble, H. Wyatt, J. Procter, and J. Eaton, were elected Members. Mr. H. Bird was elected an Associate.

The Secretary, Mr. Mercer, announced donations to the Library of £5 each from Messrs. Meggeson & Co., London, and Samuel Johnson, Esq., Church Street. The thanks of the Society were passed to these gentlemen for their liberal donations, with which thirty-three volumes have since been purchased by the Council.

The Secretary also exhibited a specimen of the *Andropogon Sorghum* in seed, which had been grown in a greenhouse from seed presented to the Society last session.

Mr. Abraham read a "Summary of Facts relative to the Quality of the Liverpool Water Supply." This subject is at present exciting a large amount of local attention, and the paper was followed by a very animated discussion.

Thursday, 5th Nov., 1857.

THE PRESIDENT IN THE CHAIR.

Messrs. T. Britten, H. Baskerville, W. Rayner, and W. Dantec, were elected Members. Mr. W. Smith was elected an Associate.

The Secretary announced donations to the Library and Museum from the President, Messrs. Abraham, W. Allen, and himself.

Mr. Clapham exhibited specimens of Persian Rose Water, Conserve, &c.; and Mr. Mercer a simple and compact Electro-Magnetic Apparatus, of American manufacture, for medical purposes.

Dr. Edwards delivered the first of a series of lectures on "Heat in its relation to Pharmacy." The subject was treated in the most practical manner, and largely illustrated by diagrams, tables, and vessels of platinum, silver, porcelain, and earthenware. *Heat of Temperature* was the subject of the present lecture, its transmission by conduction, radiation, and reflection; its expansive effects upon solids, liquids, and gases; the manufacture of thermometers and pyrometers explained; the effects of heat upon the solution of saline and extractive matters, especially dwelt upon, and many practical hints given on the solutions of salts, and making of infusions and decoctions. The merits and value of different materials for flasks, retorts, test-tubes, beakers, basins, and crucibles, were discussed, and the comparative cost and value estimated.

The subject elicited considerable interest.

Thursday, 19th Nov., 1857.

THE PRESIDENT IN THE CHAIR.

Mr. J. McInnes was elected a Member, and Messrs. W. Whittaker and G. Rawland Associates.

The President presented a sample of Syrian Scammony, and the Resin obtained from it. It contained 33 per cent. of scammony resin.

The Secretary exhibited two Patent Bottles, presented to the Museum by Mr. G. Thompson, and the stoppers of which were fastened by a spring lock.

Dr. Edwards delivered his second lecture on "Heat in its relation to Pharmacy." The subject of the present lecture was *Heat of Condition*, or *Latent Heat*. It was well known that when a body passes from the solid to the liquid state, or from the liquid to the gaseous, a large amount of heat is absorbed, which is, however, again given out when the body reassumes the denser condition. It is also observed that all bodies, especially liquids, are not equally heated for the same amount of temperature applied, a portion of the heat being absorbed at the higher temperature, which is called the specific heat. The liquefaction of solids by melting and by solution, the vaporization of liquids by heat and by removal of pressure, were noted,

and the various modes of distillation and condensation of vapours and gases illustrated by drawings, models, and vessels. The advantages of electro-coppered flasks, and of retorts coated on the interior with precipitated silver, shown in certain cases. The processes for manufacture of extracts by the steam pan and in vacuo, explained, and the relative merits discussed, which elicited further remarks from Mr. Abraham, the President, and others, tending to show that the process in vacuo was not better than the steam-pan, unless the utmost attention was paid to the process, a good vacuum maintained, and the product removed from the pan when it began to thicken, and finished in a warm air closet.

Dr. Edwards was requested to continue the subject.

ORIGINAL AND EXTRACTED ARTICLES.

HYDROCOTYLE ASIATICA.

Attention has been recently directed by Mr. Jules Lépine, *pharmacien* of the first class in the French navy, to the remedial value of *Hydrocotyle asiatica* Linn. in certain cutaneous diseases.

The plant, which belongs to the Natural Order *Umbelliferæ*, is a native of India, where, according to Roxburgh, it is of common occurrence, appearing with most luxuriance during the rainy season. Ainslie states that an infusion of the leaves is administered by the natives in cases of bowel complaint and fever, and that on the Coromandel coast, the leaves are used as a cooling application to bruises. The same author states upon the authority of Dr. Horsfield, that in Java the plant in question has the reputation of being an excellent diuretic.*

The diseases in which *Hydrocotyle asiatica* is now recommended are tuberculous lepra, elephantiasis, eczema, scrophula, scrophulous ulcers, syphilis and rheumatism. In India considerable success appears to have attended the use of the new medicine, and several exceedingly laudatory accounts of it have been published. M. Cazenave of the Hôpital St. Louis in Paris after administering it in a great number of cases of various forms of skin disease, hesitates to pronounce any decided opinion as to its merits, but admits at the same time that he considers it likely to occupy an important place in therapeutics. "Its most remarkable and most constant effects," says he, "are a considerable increase of the urinary secretion, increased heat of the skin, and production of copious perspiration. Its inconveniences, as in the case of remedies derived from the *Solanaceæ*, are flushings of the face, restlessness, loss of appetite, sensation of heaviness in the head and giddiness."

The modes in which *Hydrocotyle asiatica* may be administered, are the following:—1. The *powdered dried herb*, of which 7½ grains is a full dose; 2. An *infusion* prepared by macerating 2 drams of the herb in 16 ounces of water, which it is said may be given to the extent of 16 ounces per day; 3. An *alcoholic extract*, dose ½ to ¾ of a grain; 4. A *syrup*, containing 1½ grains of extract to 1 fluidounce of syrup. An ointment of Hydrocotyle has also been recommended.

SANGUINARIA CANADENSIS *LINN.*

In the August number of this Journal we noticed the employment of *Sanguinaria Canadensis* Linn. by Dr. Fell in the treatment of cancer. We now give a figure of the plant, taken from *Curtis's Botanical Magazine*, vol. v., pl. 162.

Sanguinaria Canadensis Linn., natural order *Papaveraceæ*, is a plant common in the woods of Canada and the United States, where it is well known for its delicate white flowers which appear in early spring. The cut root emits an orange-coloured juice, whence the popular name *Blood root* and the Latin *Sanguinaria* are derived. The medicinal activity of the plant is supposed to reside in an alkaloid named *Sanguinarine*, a yellowish, pulverulent substance, having the composition of $C_{36}\ H_{17}\ N\ O_8$.†

* *Materia Indica*, vol. ii. p. 473.

† Dorvault, *Revue Pharmaceutique* de 1856.

SANGUINARIA CANADENSIS *LINN.*

STUDY.

(Second notice.)

BY MR. INCE.

I ONCE ventured to make a few suggestions with regard to study—the attempt proved successful, and the practical result obtained was beyond my anticipation.

The subject is one of extreme difficulty, chiefly because it is so very easy to write generalities which read remarkably well and lead to nothing; and so very hard to contribute thoughts of actual value, expressed in the plain language in which everybody thinks.

Two things go to form a Chemist;—the knowledge of his business, and a fair acquaintance with Latin, French, and German. He *can* keep a shop, and get through the world without such aid, as a man *may* hobble with one leg, though there is an advantage in his having two.

But here, even on the threshold, a strange hindrance bars the way. When first the student has ceased to think with hatred on the drudgery of school, and wakes up to the reality of life, he enters on his career with almost unnatural energy; that is, if there is anything at all in him, for some go mentally to bed for ever. At this turning-point the companionship of one real friend is worth more than riches; should such a friend, sitting by the fireside, tell him, from personal experience, that that which will make his business, gain him a position, and save him from himself, is study, his mind fires at the thought; the spark of ambition is lighted up within him, and at once, energetically, not to say frantically, he sets about his work. It does not do to trust in spasms. Other influences interfere, but they are trifles light as air, compared with the disastrous action of a change of mind. Yes, sooner or later this will happen. The novelty of study is no more—a calm begins little by little to steal upon the student; interest fades by slow yet sure degrees; the same subjects fail to suggest the same ideas, until they are at last gazed on with a dull and listless eye; while at this critical juncture some good friend is sure to whisper, "shut your old tomes, and come to Evans's."

Nothing, perhaps, is more unfortunate, than that the student at this disheartening period should meet with one of those very proper, well-meaning essays, on the value of education. These praiseworthy sermonizings effectually extinguish the faintly-flickering flame, for nothing can persuade the student but that the path pointed out is not one destined for *him* to enter; that his capacities are unequal to the task; and that the field of study with its future hopes and present joys, is reserved for others more fortunate than himself. Therefore it is of the deepest importance that he should know that this unwilling apathy falls, some time or other, to every one; and while the fit lasts, not all the argument under heaven will affect the case. One course alone is open.

Even when the page is driest and most wearisome, let him still go on—the darkest night will have a morning, and sooner, a vast deal sooner than he thinks, light will shine out upon the drudgery, and he will have gained a power of which he never before was conscious, and which no man possesses who has not passed through the struggle. The best way to surmount a difficulty is to meet it.

This leads to the second point. Exactly a year ago, I tried to prove that late hours were not the most favourable soil for studious habits; whereupon five letters made their joint appearance in the Journal.

Three advocated the claims of a compulsory examination, and one, on the theory that whatever is is best, recommended the Assistant to gather the stray crumbs that might chance to fall from the well-stored mind of contiguous wisdom, and, aided by the crumbs aforesaid, learn to be content. But there was a concluding letter (vol. xvi., page 387) written by Mr. R. W. Giles, so

true, so sensible, and withal so just, that had I not personally known the author, I should have been astonished.

The tenor of his remarks is this. The Assistant, once in business, should have ceased to study, and begun to practice—it is not when the soldier is in battle that he should learn to drill. Moreover, the scanty preparation of a necessarily interrupted course will never fit him either for an examination or for his after duties, since the neglect of years is not to be compensated by the application of an hour. With this I cordially agree, but it regards the subject in a different point of view from that in which I placed it.

Sorry should I be to depreciate, even apparently, the value of the Diploma of the Society—it was my sole endeavour to convince the Assistant of the extreme personal gain of personal study. Nor can I see why he should be deterred from that which is within his reach, because he cannot grasp something which may be beyond it. True, indeed, the Society's Diploma can scarcely, with rare exceptions, be fairly won, save by a preliminary well-directed education; can that be a reason why a whole army of Chemists' Assistants should stand with their hands before them, and say, "Circumstances have made me a donkey, and I will remain so?"

Thus, advancing step by step, theory gives place to practice, and even at the risk of sharing the reputation of "single speech Hamilton," I must once more make the assertion, that the regular employment of one hour a day can accomplish wonders. Unhappily, in the case of the Assistant Chemist, Habit is far more at fault than Will—the first thing, therefore, is to acquire the mastery of habit, and to wake up a dormant interest.

Certainly the way to effect this is not to commence with a Latin Dictionary and the Pharmacopœia. I believe sincerely the best method of bringing the mind into a proper tone of feeling, is to attack a foreign language. Its study brings with it instant satisfaction, each word acquired is something gained—to use a trade simile, it is cash on delivery. Not to weary with a thrice-told tale, may I be allowed to offer German as a good beginning? and as it will form the only illustration, a few words of caution may not be out of place.

(1.) Whatever system professes to teach without a master, or ventures to express the pronunciation in written characters, should be avoided. No living language can be learnt without a living master, and were only two or three to meet together, the most moderate salary would be equal to the expense. (2.) Those systems which teach entirely without grammar, seem to me to lay a great tax on the memory without any adequate result. By this method, a rapid conversational ease is soon acquired, which by the least want of practice is as rapidly forgotten. There is no principle to guide the choice or use of words. The theory is that we should learn a foreign language as a child does its own mother tongue—but we are *not* children; the mind is crowded with a thousand other things, while the poor infant has only got to cut its teeth, and to acquire its speech. A directly contrary opinion, however, is maintained by some competent authorities, particularly by Capt. Basil Hall. (3.) Those systems which teach a language by misspelt sentences, and purposely incorrect exercises, are a practical mistake. Error is imbibed quickly enough without hastening after it by a special train. (4.) A cheap and useful system is that called *The Practical and Easy Method*, by F. Ahn.

Asking allowance for these details, I am satisfied that the moment there is the smallest progress made in this pursuit, a new bias of thought and feeling is established — an eagerness hitherto unknown begins to spring, and the Assistant grows discontented with himself; the brightest era in his life. Soon he becomes absolutely ashamed to have let one year after another pass with nothing but regret to mark their flight. The charm begins to work; and, as day by day the mechanical toil of study lessens, slowly, yet surely, he gropes his way from the dreariness of rules and grammar into the welcome light of literature.

Nor is it with a careless hand that I have selected German—admirable as a study, not only because its rugged syllables enshrine some of the loveliest and most airy specimens of imaginative writing, together with those famous lyrics, which not to know is to be exiled from the world of taste; but also because it is the language from which—proud as we are as Englishmen—three-quarters of our modern Chemistry has to be translated.

But here a rather far-sighted person rises to remonstrate. "My good sir! your patent Assistant should learn his doses, and not be reading Schiller." Respected individual! The great task was to create an interest, no matter what; to break up the nothingness of an aimless life; to inspire a wish for something higher and better—this once accomplished, the man is a changed being, of which the first symptom is that he will begin to respect himself, and be too proud to allow apprentices to collect Herbaria while he rests ignorant and helpless, and not another week will pass which will not find him deep in Pharmacy, and dreaming of Richard Phillips.

I ask every Assistant Chemist in London whether the reward does not warrant the attempt? whether the result be not at least as satisfactory as the certain end of a three years' course of Casino, and Half-price? and lastly, whether the consciousness of undoubted self-advancement be not worth something on its own account and for itself? But so long as the delusion lasts that nothing should be ventured where there is no chance of grasping all, and that knowledge is only so far useful as it secures a title, the usual sickening apathy will enshroud the Assistant's mind, never to be dispelled, until in due time he is drifted into some monotonous marine store in the country, and forgotten. One hour's work each day will save him—one hour's application will put him beyond the fear of status—one hour's uninterrupted daily reading will raise him above Tom Thumb, though it may not make him Faraday.

Now, does any Assistant in London mean to say that such are the exigencies of his business, and such the nature of his occupation, that he cannot reserve one hour, that is sixty minutes in the day, for his own purposes? It is within the range of possibility that such a place exists. May the spirit of Christmas come upon the master.

31, *Southampton Street*, *Covent Garden*.

REPORT OF THE

RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,

AND OF THE

APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

BY B. H. PAUL, Ph.D.

(*Continued from p.* 281.)

Notes on Fermentation.—The analogy between the sugars and the polyatomic alcohols glcyerin, mannite, dulcin, and sorbin has been extended to the phenomena of fermentation.* These substances may be converted directly into alcohol and carbonic acid. In this change hydrogen is eliminated as a consequence of the composition of these substances, which differ from the true sugars, in containing more hydrogen than would be required to form water with their oxygen. These substances may also be converted into lactic or butyric acids by fermentation.

The conditions under which this change is effected differ from those under which it takes place with true sugars. At a temperature under 50° C. it requires several weeks or even months, the ferment being some nitrogenous animal substance, such as casein. The presence of carbonate of lime is necessary for the production of alcohol from mannite, glycerin, &c. This substance would appear to consist in

* Berthelot, *Comptes Rendus*, xliv., 1857, 702.

determining the kind of decomposition which the ferment undergoes, and also in neutralizing acids generated during the fermentation.

Under the same conditions, alcoholic fermentation is set up with true sugars, milk sugar, and the substances which are convertible into sugar by the action of acids.

In the production of alcohol and carbonic acid from true sugar by means of these ferments, the presence of carbonate of lime is not absolutely necessary, though it increases the amount of alcohol. In the fermentation of glucose, carbonate of lime may be replaced by other carbonates, oxides, and even by metals, as iron, zinc, &c.

The influence exercised by the ferment in these cases of fermentation, appears to depend, not upon its structure, but upon its composition, for these results are produced only by substances analogous to casein, particularly with gelatin, which is entirely destitute of organic structure. Neither does the development of particular organisms appear in any way necessary, the results being precisely the same when this is prevented by excluding air during the fermentation.

This fermentation under the influence of casein or similar substances, presents a striking difference from the fermentation of sugar with yeast, in the fact that, as it progresses, the ferment is decomposed, and, without putrefying, evolves nearly all its nitrogen in the gaseous state. The precise nature of this mutual action, and the relation in which it may stand to contact action, with which the influence of yeast upon sugar has such a marked resemblance, still remains to be ascertained. However, this fact, together with the reaction of emulsin with amygdalin, of diastate with starch, of pancreatic juice with neutral fats, of glycerin with oxalic acid, of sulphuric acid or electronegative substances with cane-sugar, alcohol, or turpentine, would seem to show that in fermentation much depends upon the chemical nature of the substance which assumes the character of ferment, and upon the successive changes which it undergoes in composition. Probably the influence of these conditions is greater, even in fermentation with yeast, than that of organic structure.

Hygroscopic Character of Zeolites.—M. Damour* finds, that with the exception of analcime, powdered zeolitic minerals lose their water in dry air at temperatures varying from 40° C. upwards, and that in moist air they reabsorb the water they have lost. When the minerals are heated above a certain temperature, which differs for each species, the water lost by drying is not again absorbed. The readiness with which these minerals give up their water is directly proportionate to the amount they contain.

Reaction of Molybdate of Ammonia with Silica.—When a solution of silicate of potash is added to a solution of molybdate of ammonia mixed with excess of nitric acid, the liquid becomes yellow, in the same manner as if it contained phosphoric acid. When much molybdate of ammonia is present, and but little chloride of ammonium, an almost white precipitate is deposited after some hours, and the liquid remains yellow. When much chloride of ammonium is present, a copious yellow precipitate separates after some hours.†

This fact must be borne in mind in testing for phosphoric acid with an acid solution of molybdate of ammonia, and care must be taken to separate silica from solutions that are to be tested for phosphoric acid in this way.

The reaction which dissolved silica gives with the molybdic solution, is very delicate, and the precipitate presents the same behaviour with ammonia as that produced by phosphoric acid.

Acetate of uranium does not give a precipitate with free silica, but when a solution contains both silica and phosphoric acid, the precipitate of phosphate of uranium may be mixed with silica.

Double Cyanide of Iron and Aluminium.—Ferrocyanide of potassium precipitates alumina entirely, even from very acid solutions. The composition of the precipitate is represented by the formula $3\ Fe\ Cy + 2\ Al_2\ Cy_3$. The analysis of the ash gave:

			Calculated.	
$Al_2\ O_3$	44.89	100.00	46.42	100.00
$Fe_2\ O_3$	55.11		53.58	

* *Comptes Rendus*, xliv., 975.

† Knop, *Chem. Central-Blatt*, 1857. No. 44.

Consequently, this substance corresponds to Prussian blue, the sesquicyanide of iron being replaced by sesquicyanide of alumina.*

Artificial production of a Fat Acid.—Cyanide of cetyl (C_{32} H_{33}, C_2 N) boiled for some time with an alcoholic solution of potash, evolves abundance of ammonia, and yields a saponaceous residue, from which, by fractional precipitation with chloride of barium, two fat acids are obtained, one which melts at 66°.2 C., has probably the composition C_{38} H_{38} O_4, and another, which melts at 59°.9, and crystallizes in scales.† The analyses show that this latter is margaric acid (C_{34} H_{34} O_4); it differs from the substance hitherto called margaric acid, not only in the melting point and crystalline form, but also in not being separable by fractional precipitation, into stearic and palmitic acids. The lowest melting point (59°.5 C.) of mixtures of this acid with stearic acid is not so far below that of the pure acid as is the case with mixtures of stearic acid and the substance hitherto called margaric acid.

Cyanide of cetyl was obtained by heating sulpho-cetylate of potash with pure cyanide of potassium to near 200° C. The product was impure, being mixed with cetyl-ether (C_{32} H_{33} O) and palmityl-aldehyd (C_{32} H_{32} O_2) which could not be completely separated from the cyanide of cetyl.

This substance has also been prepared in Prof. Limpricht's laboratory at Göttingen, by boiling iodide of cetyl with alcohol solution of cyanide of potassium.‡ It is described as a crystalline substance, readily fusible and soluble in alcohol or ether, but not in water.

The fat acid obtained by boiling this substance with alcohol solution of potash, was purified by precipitation as a lead salt from alcohol solution, then separated by hydrochloric acid, and precipitated in fractions with acetate of baryta. The melting point of the several portions varied from 50° to 53° C.; and from the differences in the analytical results, together with the above observations, it would seem that the acid obtained, though probably margaric acid, was mixed with other substances.

Dioscorea Batatas.—The roots of this plant, grown in the Botanic Garden at Bonn, have been analyzed by Dr. Grouven,§ and gave the following results as compared with potatoes:

	BATATA.	WHITE POTATO.	
		Inorganic manure, mean of 7 analyses.	Nitrogenous manure, mean of 7 analyses.
Water	83.00	76.40	75.20
Starch	8.00	14.91	15.58
Protein substances	1.13	2.17	3.60
Mucilage—dextrin	1.92	2.34	1.29
Sugar	0.72	0.15	0.11
Fat	0.32	0.29	0.31
Extractive	3.11	1.70	1.79
Ligneous fibre	0.70	0.99	1.03
Ash	1.10	1.00	0.90
	100.00	100.00	100.00

It would appear, therefore, that the batata grown in this climate is not equal to the potato in nutritive value.

Protosulphide of Carbon, CS.—A colourless gas, with an odour like that of the bisulphide. It burns with blue flame, yielding carbonic acid, sulphurous acid, and sulphur. It is denser than carbonic acid. Water dissolves its own volume; the solution is soon decomposed, yielding sulphuretted hydrogen and carbonic oxide. The gas is not dissolved more copiously by alcohol or ether than by water, and not at all by subchloride of copper solution. It is decomposed by alkaline solutions, yielding sulphide and carbonic oxide. At a red heat, it is decomposed by platinum

* Tissier, *Comptes Rendus*, xlv., 232.
† Heintz, *Bericht der Akad. der Wissens. zu Berlin*, 1857, p. 417.
‡ G. Becker, *Annalen der Chemie und Pharmacie*, cii., 209.
§ *Zeitschrift für Deutsche Landwirthe*, 1857, p. 223.

sponge, water vapour, sulphuretted hydrogen, or copper. With chlorine, in sunlight, it yields compounds which are being examined.*

This substance was obtained by passing bisulphide of carbon vapour over red-hot platinum sponge or pumice-stone, and in the preparation of the bisulphide in the ordinary way. Also, by igniting sulphide of antimony with carbon; by igniting a mixture of sulphuretted hydrogen and carbonic oxide; by igniting sulphurous acid with carburetted hydrogen; by igniting bicarburetted hydrogen with chloride of sulphur; and by heating sulphocyanogen.

This gas has already been mentioned by Persoz.†

Influence of Nascent Hydrogen upon Amalgamation.—M. Cailletet‡ states that when sheet-iron, platinum-foil, or aluminium is shaken with ammonium amalgam, or with sodium amalgam and water, an amalgam of iron, platinum, or aluminium, is produced at the surface of the metal. When two pieces of platinum-foil are connected with the poles of a battery, and immersed in acidified water, if the negative electrode is brought in contact with mercury the platinum combines with it. M. Cailletet endeavours to show that this amalgamation is due to the action of nascent hydrogen.

Chemical Influence of Pressure and Heat, &c.§—A sheet of iron exposed to moist air is oxidized first at those points where the metal is heterogeneous in relation to the entire mass, or where other less oxidizable substances—carbon, silver, lead, copper—are in contact with it. Water is decomposed, and peroxide of iron and ammonia produced.

Felspar, basalt, &c., rubbed with water in an agate mortar, give up a portion of their alkali.

Masses of felspar in like manner forced by water along a river course, and rubbing against each other, are decomposed, and the alkali dissolved out.

M. Daubrée has recently suggested a method of obtaining alkali from felspar, which consists in agitating the mineral with water in a rotating tub.

Nitrate of lead and iodide of potassium rubbed together yield iodide of lead and nitrate of potash. Sulphate of soda and carbonate of lime are decomposed in like manner.

Under the influence of heat, pressure, and electricity, M. Becquerel has obtained the following substances crystallized :—

Carbonate of lime in rectangular prisms—arragonite—with measurable angles.

Sulphide of copper in six-sided prisms, similar to the native mineral.

Sulphides of silver and of lead, of metallic lustre.

Malachite and azurite in small warty masses.

Insoluble iodides, bromides, and cyanides of the metals.

Use of Anæsthetic Substances for Destroying Insects in Corn.—M. Doyère‖ recommends the use of a small quantity of chloroform or bisulphide of carbon as a good means of destroying insects injurious to corn that is to be stored.

Production of Water by contact with Platinum Electrodes.—M. Bertin¶ states that electricity, like heat, communicates to platinum the power of determining the combination of hydrogen and oxygen, both gradually and with explosion. When the current of fifty elements is passed through pure water no explosion takes place, but the level of the water in the jar oscillates up and down continuously, owing to the decomposition below the snrface and the combination of the gases in contact with the platinum plates above the surface. With the current of forty elements the gas is ignited as soon as the jar is nearly full.

Testing for Arsenic.—Dr. Blondlot, of Nancy, states,** that in charring organic masses such as ox-lung, with sulphuric acid, arsenic is retained in the coal as sulphide of arsenic, when water only is used for washing it. He therefore recommends washing the coal with ammoniacal water, and oxidizing the dissolved sulphide of arsenic with nitric acid.

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* Baudrimont, *Comptes Rendus*, xliv., 1000.
† *Chimie Moléculaire*, p. 117.
‡ *Comptes Rendus*, xliv., 1250.
§ Becquerel, *Comptes Rendus*, xliv., 993.
‖ *Comptes Rendus*, xliv., 938.
¶ *Ibid.*, xliv., 1273. ** *Ibid.*, xliv., 1222.

Native Sulphate of Soda.—M. A. de Lajonkaire states,* that this salt occurs in Spain, not only as an efflorescence, but also in considerable masses. It is associated with sulphate of magnesia, gypsum, and chloride of sodium, in the Ebro valley near Logrono; also at the Aranjuez hills near Madrid, in the neighbourhood of Lodosa, and in the mountains of San Adrian, and Alcanadre.

Reaction of Oxide of Silver with Compounds of other Metals.†—Since oxide of silver may, like the alkalies, be assumed to consist of two atoms of metal and one atom of oxygen, it should be a strong base, in accordance with the view that the basic character of metallic oxides is determined, not only by the nature of the metal they contain, but also by the smaller number of atoms of oxygen combined with that metal. But, from the electronegative character of a metal, the basic character of its oxide may be considerably less than it otherwise would be; and this is the reason why several oxides, whose composition is represented by the formula RO, appear as stronger bases than oxide of silver, and precipitate it entirely from solution. Nevertheless, on account of the great affinity of silver for chlorine, many of these bases may be entirely precipitated from solutions by oxide of silver, and especially by carbonate of silver, when solutions of the corresponding chlorides are brought in contact with these substances. This fact may be of great advantage in analytical operations, since oxide of silver may be very easily separated from solution by means of hydrochloric acid.

When solutions of alkaline chlorides are brought in contact with moist oxide of silver, chloride of silver and caustic alkali are produced. By heating this mixture, some alkaline chloride is reproduced; for though moist chloride of silver is not considerably affected by caustic potash at the ordinary temperature, a partial decomposition takes place after the lapse of some time, and more rapidly when the mixture is boiled. Carbonate of silver decomposes alkaline chlorides in solution, more slowly, but still completely; for the solutions of the alkaline carbonates do not effect any sensible decomposition of chloride of silver, even when boiled with it.

The bromides and iodides of the alkaline metals react in the same manner, especially with carbonate of silver.

Alkaline carbonates are not decomposed by oxide of silver; but the bicarbonates, in solution, are converted into simple carbonate with production of carbonate of silver.

Alkaline sulphates are not affected by oxide of silver; a solution of nitrate of potash dissolves some oxide of silver, but nitric acid cannot be recognized in the undissolved portion.

The alkaline earths are stronger bases than oxide of silver, and separate it from solutions of silver. Chlorides of barium or calcium are decomposed at the ordinary temperature by oxide of silver; chloride of silver and hydrates of the alkaline earths being produced. But when solutions of the alkaline earths are boiled with chloride of silver, a portion is decomposed, and oxide of silver reproduced. The chlorides of the alkaline earths are slowly decomposed by moist carbonate of silver at the ordinary temperature; chloride of silver being precipitated with earthy carbonate, and only a minute trace of carbonate of silver remaining in solution. Since the alkaline earths are not precipitated by oxide of silver or by carbonate of silver, the chlorides of these metals may be separated by means of carbonate of silver from the oxygen salts of these metals and of magnesium.

A solution of nitrate of baryta dissolves a sensible amount of oxide or of carbonate of silver, without any precipitation of baryta, at the ordinary temperature. Nitrate of lime does not present the same character.

Magnesia is also a stronger base than oxide of silver, and precipitates it from silver solutions. But carbonate of magnesia precipitates silver as carbonate, even at the ordinary temperature, which is remarkable, since carbonate of baryta does not produce this effect. Consequently solutions of nitrate or sulphate of magnesia are not affected by oxide or carbonate of silver, while chloride of magnesium would be entirely separated from solution by either reagent. Alumina is completely separated from solution by oxide or carbonate of silver. Glucina, however, is separated

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* *Comptes Rendus*, xlv., 17.

† Rose, *Berichte der Berliner Akademie.*

only by oxide of silver and not by carbonate of silver. Ytteria is but partially precipitated from its sulphate by oxide of silver.

A solution of protosulphate of manganese, digested with moist oxide of silver, soon becomes intensely black. When an excess of oxide of silver is used, the filtered liquid contains much silver, but no manganese. With carbonate of silver the same effect is produced, with evolution of carbonic acid, but much more slowly. In this reaction the oxide of manganese is converted into peroxide of manganese, and the oxide of silver into suboxide, which combines with the peroxide of manganese, producing a saline substance, which varies in composition. When the mixture is heated and the precipitate washed with hot water, it has a dark brown colour, and consists of equal equivalents of peroxide of manganese and suboxide of silver. When the decomposition takes place at the ordinary temperature, and the precipitate is washed with cold water, it contains, in addition, two equivalents of oxide of silver.

A solution of protosulphate of manganese mixed with a solution of nitrate of silver, to which ammonia had been added, until the precipitate at first produced is redissolved, at once gives a precipitate of the black substance. Solutions of protacetate of manganese and of acetate of silver give the black precipitate without addition of ammonia. When nitrate of silver is used the precipitate separates more slowly, but in both cases only a small amount is produced, and a much larger amount is precipitated on the addition of ammonia.

When a solution of protosulphate of iron is mixed with a solution of nitrate of silver, metallic silver is precipitated. But when the peroxide of iron thus produced is not able to combine with an acid, as when moist oxide of silver is added to a protosulphate of iron solution in excess, it dissolves at first, and then becomes black, but metallic silver is separated after some time; when a larger amount of oxide of silver is used, the black substance is more stable, and then the filtered liquid does not contain any iron, but sulphate of silver in solution. The black substance is obtained most readily when a solution of nitrate of silver, to which ammonia has been added until the precipitate produced is redissolved, is mixed with a solution of protosulphate of iron. This substance consists of 1 at. suboxide of silver, 2 at. protoxide of iron, and 1 at. peroxide of iron, which is in the relation of an acid to the other oxides. It is very stable; at a dull red heat, water is separated; and at a higher temperature silver is reduced. Some silver is reduced by the action of hydrochloric acid, more by acetic acid. With chloride of gold it yields chloride of silver and metallic gold.

Another compound of 1 at. suboxide of silver with 1 at. peroxide of iron ($Ag_4 O$, $Fe_2 O_3$) is produced when a solution of protosulphate of iron is mixed with excess of an ammoniacal solution of oxide of silver.

When solutions of acetate of silver and acetate of protoxide of iron are mixed, a certain amount of the black precipitate is produced without addition of ammonia; but it becomes white after some time, owing to the reduction of silver and solution of oxide of iron by the acid.

When the solutions are very dilute no immediate reaction takes place, but when the liquid is made slightly basic, the black substance is at once precipitated. This effect is produced not only by ammonia, potash or soda, but also by compounds of these bases with weak acids, such as carbonic or phosphoric acids, further, by carbonates of lime, baryta, or lead; by basic carbonates of magnesia or zinc. The neutral salts of the alkalies containing nitric, sulphuric, oxalic, tartaric, and even acetic acid do not cause the production of the black substance, a fact which shows, among other things, that in the wet way acetic acid is a stronger acid than phosphoric acid.

With cobalt salts oxide of silver reacts in the same manner, but more slowly, and a black compound of suboxide of silver with peroxide of cobalt ($Ag_4 O$, $Co_2 O_3$) is produced, and an excess of oxide of silver precipitates the whole of the cobalt from solution. With carbonate of silver this reaction does not take place.

Nickel salts react but partially with oxide of silver, and even when the liquid is boiled, the whole of the nickel is not precipitated. Oxide of cadmium, although one of the weaker bases, is but partially precipitated by oxide of silver at the ordinary temperature, and wholly only when the liquid is boiled.

Oxide of zinc is precipitated from the sulphate completely, at the ordinary tem-

perature, by oxide of silver, but only partially by carbonate of silver, even when the liquid is boiled.

Chloride of lead in solution is completely decomposed by oxide or carbonate of silver; the nitrate or acetate are only partially decomposed by oxide of silver, but completely by carbonate of silver.

Chloride, sulphate, or nitrate of copper are completely decomposed by oxide of silver. This relation of oxide of silver to oxide of copper is an instance in support of the view that the basic character of oxides is determined both by the electro-chemical grade of the metal, and by the number of oxygen atoms they contain. Copper is more electro-positive than silver, which is precipitated by it from solution. If oxide of copper and oxide of silver had the same atomic composition, oxide of copper should be more basic than oxide of silver, but, as this is not the case, they cannot have the same atomic composition.

Suboxide of copper precipitates from sulphate and nitrate of silver solutions a grey mass, consisting of metallic silver, with insoluble basic sulphate and basic nitrate of suboxide of copper, while sulphate and nitrate of copper pass into solution—an action the same as that of a mixture of equal equivalents of metallic copper an oxide of copper.

Chloride of mercury in solution is completely decomposed by oxide or carbonate of silver. Nitrate of mercury gives with a little oxide of silver a white crystalline precipitate of a double salt of nitrate of silver and mercury ; excess of oxide of silver precipitates the whole of the mercury as oxide. Solution of sulphate of mercury gives at the ordinary temperature a yellow precipitate of basic sulphate of mercury, and though further addition of oxide of silver causes separation of all the mercury, the precipitate contains sulphuric acid, which is separated only by long digestion and frequent stirring.

Subchloride of mercury is decomposed by moist oxide of silver, yielding chloride of silver, and suboxide of mercury, which is partially decomposed into oxide of mercury and metallic mercury. Oxide of silver precipitates suboxide of mercury from a solution of nitrate of suboxide of mercury.

A solution of potassio-chloride of gold is decolorized by moist oxide of silver. The solution contains caustic potash, and the precipitate consists of chloride of silver, oxide of gold, and the excess of oxide of silver.

Oxide of chromium is completely precipitated by oxide of silver from a solution of chrome alum. A solution of chrome alum mixed with excess of caustic potash gives with nitrate of silver a precipitate of oxide of silver, but the oxide of chromium in the alkaline solution is converted into chromic acid.

Oxide of bismuth is completely precipitated by oxide of silver, from an acid solution of nitrate of bismuth.

Characteristics of Coal, and Distinction between it and Bituminous Shale, &c.—The question as to the nature of the Boghead mineral has recently become a disputed point between two gas companies in Frankfort, and has been referred to Prof. Göppert, of Breslau, for his opinion. He commences his report* by remarking that the production of coal seems to have resulted from the deposition of large masses of organic substance, chiefly remains of plants, over surfaces of greater or less extent, and upon previous deposits of sand, clay, or mud, which, in consequence of the pressure and decrease of moisture, hardened gradually, and now appear as sandstone or clay slate. Coal beds generally occur as regular strata, of considerable extent and uniform thickness. They are sometimes quite horizontal or mullar-shaped, which shows that they were deposited either upon the bottom of the sea, or upon a slightly inclined and even coast, or most frequently in closed basins. This view agrees with the opinion now generally received, that during and after the deposition of the rocks comprised in the transition series, the continent of Europe was submerged beneath an immense ocean, studded with islands. But since the number of marine remains found in the coal formation is comparatively small, and since coal itself has originated almost entirely from land plants, it may be assumed that the sea had but a transitory share in the production of coal beds. There are no grounds for supposing that the material from which coal originated was transported by the sea from any considerable distance to the places where it is now

* *Zeitschrift für das Berg Hütten und Salinenwesen und preussischen Staate*, 1857, v., 1.

situated. All observed facts indicate, on the contrary, the prevalence of the greatest tranquillity during the actual production of coal. It is probable that the vegetation of that period, consisting of araucaria, lycopodia, ferns, equisetaceæ, sigillaria, stigmaria, &c., in the luxuriant development peculiar to tropical climates, covered large extents of low plains near the sea-coasts. Alterations of level of the surface produced overflow of the sea ; the submerged vegetation being in course of time covered with fine sand and clay. By such repeated alternate elevations and depressions, with intervals, during which the newly-exposed surface became covered again with fresh vegetation, the several coal beds comprised in a coal basin were produced one above another, with layers of sandstone or shale between them.

When the layers of coal acquired a considerable degree of solidity before the deposition of the sand or clay, and when this took place gradually, the coal and other layers would be sharply separated ; but when, on the contrary, the submerged remains of plants were prevented by any cause from forming a coherent layer, particles of organic substance would be mixed with the mineral substances in the act of deposition, giving rise to the production of layers of shale, highly impregnated with carbonaceous substance, and known by the names of coal shale, bituminous shale, &c. The more or less dark colour of these layers depends upon the amount of organic substance. Besides the difference indicated by chemical analysis between the amount of mineral substance in these shales, and in true coal, they are also distinguished by shale giving a brown streak upon paper, while coal gives a black streak. This difference in the colour of the streak depends upon a difference in the state of preservation of the organic substance. In shale it appears, when examined by aid of the microscope, brown ; and hence, in a less advanced stage of decay than in coal, where it appears black. In this brown organic mass may be recognized cells of the plants, from which it originated. Ordinary coal or cannel coal, examined by aid of the microscope, appears almost entirely opaque, with only a few brown transparent specks, where it is but rarely possible to recognize cells filled with yellowish-brown substance. The case is different with the so-called mineral charcoal, mixed with almost every true coal. This, when carefully split, presents cells and reticular vessels in various alternations. The former belong to coniferæ, the latter to calamites.

Considering well this view of the origin of coal, and of shale with various amounts of organic substance, as well as the probability that the different plants from which coal has been produced, contained different amounts of mineral substance, it is not remarkable that there should be such a gradual transition from coal to shale, and such marked differences in the relative amounts of organic and mineral substance, not only in different coal fields, but also in individual layers of coal. The amount of ash for true coal rarely exceeds 5 or 10 per cent. With a larger amount of mineral substance, the character of producing a black streak disappears.

Upon these grounds Prof. Göppert pronounces the Boghead mineral to be a bituminous shale; for since its occurrence, and the plant-remains that are associated with it, show that it belongs to the coal formation, the principles above laid down as to the production of coal and shale, as well as the sole true distinction between the two, are perfectly applicable for deciding which class the Boghead mineral should be referred to.

The relation between this mineral, with its brown streak and brown plant-remains ; and true coal, the mass of which is decidedly black throughout, is the same as that between "charbon roux" and black wood charcoal. The shales are products of imperfect carbonization in the wet way, just as the "charbon roux" is the product of imperfect carbonization in the dry way. Both are richer in hydrogen than true coal or charcoal, and consequently they are better adapted for the production of combustible gas than the latter are.

NOTE ON A FILAMENTOUS SUBSTANCE SURROUNDING THE *COCCUS VITIS*, OR MEALY BUG OF THE VINE,

And Resembling the Crude Insect White Wax of China.

BY JOHN QUEKETT, ESQ.

In the twelfth volume of this Journal, at pages 476 and 482, are papers by Mr. Hanbury and Mr. Quekett on the Insect White Wax of China, in which the origin and characters of that substance are described, and its appearance under the micro-

scope illustrated by drawings. Mr. Quekett has recently referred again to the subject in a paper read before the Microscopical Society, and published in their journal, on the discovery of a similar filamentous substance on the mealy bug of the grape-vine. After alluding to his previous communication in the *Pharmaceutical Journal* for April, 1853, Mr. Quekett says:—

"Since this time my attention has been directed to all the insect productions I could meet with that, as far as external appearances were concerned, at all resembled the insect wax; and, with this view, the coccoons of insects, and the white flocculent substance known as American blight, have been examined, but none of these presented the same character as the wax in question; it however happened, that about six weeks since I was spending an evening with Mr. Furze, one of our members, when a gentleman of the party, Mr. Evans, a surgeon, from Walthamstow, brought for examination some specimens of the mealy bug, which at that time he had discovered on one of his grape-vines. On seeing this for the first time, I was immediately struck with its resemblance to that of the *Coccus Sinensis*, and at once, with Mr. Evans's permission, proceeded to examine the white filamentous mass beneath the bodies of the creatures. It was first seen by reflected light, and many of the filaments which appeared to be on the stretch were quite straight, whilst others in their neighbourhood were spirally twisted, somewhat like the fibres of the smaller spiral vessels of plants. In endeavouring to remove some filaments for examination as transparent objects, they were found to be very elastic, and, if torn forcibly away, they would coil themselves up into a small compass, and, unless moistened with some fluid, it was difficult to isolate any of the individual filaments. It was mentioned, in the description of the insect wax of China, that there was a repellent power for other fluids except alcohol, and such was found to be the case in this instance, the filaments not being readily moistened by any other fluid. On examining the filaments with a power of 250 diameters, two kinds were apparent, one rather less in size than the largest filaments of the Chinese insect wax, varying in diameter from the $\frac{1}{4500}$ to $\frac{1}{5000}$ of an inch, the other very much smaller, and agreeing with the smaller filaments of the cochineal wax; all on being broken were found to be more or less curved. On lifting up one of the Cocci, numerous ova of a pinkish colour were found imbedded in waxy substance. These are now visible in the wax beyond the body of the creature, the parent Cocci being now dead and much shrivelled up. On applying heat to the filaments they melt, but not so readily as those of the *Coccus Sinensis* and cochineal insect, neither is there such an evident attempt at crystallization. When we consider the tubular character of these filaments, it is evident that there must be some special organ, or set of organs, through which the waxy substance has been made to pass; in fact, it resembles macaroni on a very small scale.

"As I have hitherto failed in making this out, I have thought the subject worthy of the attention of the Society, knowing that it numbers amongst its members several individuals who have both the skill and the opportunity to carry on investigations of this nature.

"*Note.*—Since this paper was written, Mr. Busk, at one of the meetings in the last session, directed the attention of the Society to a peculiar fibrous starchy material surrounding the ova. (See vol. v. *Trans.*) This was composed of solid cylindrical filaments which on analysis were found to consist of a rather unusual animal secretion, of which starch was a principal constituent."—*Quarterly Journal of Microscopical Science.*

MAPLE SUGAR OF THE UNITED STATES.

BY M. J. B. AVEQUIN.

The sugar-maple, *Acer saccharinum*, is very common in the west and the north of the United States. These trees, in many instances, entirely cover a large extent of surface, but they are more frequently dispersed through the forests among other trees, in which case from twenty-five to thirty of them are met with in an acre. This tree thrives best in rich soils, where it attains the height of the evergreen oak, or of a large apple-tree. The trunk is sometimes from two to three feet in diameter. In the spring, the maple is covered with flowers before the leaves appear. It is supposed to arrive at its complete development at the age of twenty or twenty-five years.

The sap of the maple is obtained by perforating the trunk to the depth of an inch or two. A tube is then fixed in the perforation, slightly inclined, but not penetrating to the bottom of the hole; and underneath this species of gutter a vessel is placed to receive the liquor which flows. It is customary to perforate the tree, in the first instance, on the side facing the south. When the flow of the sap begins to diminish, another opening is made on the north side. The most favourable period for this operation is the commencement of spring—February, March, and April. The sap flows for five or six weeks, and most liquor is obtained when the days are warm and the nights cool. The quantity obtained in twenty-four hours varies from a quarter of a gallon to five gallons. The temperature of the air exercises a great influence on the discharge of the sap; for example, it ceases entirely when a frosty night succeeds a warm day.

These trees do not appear to suffer much from repeated perforations. A tree has been described as having flowered after having yielded sugar for forty-two consecutive years. In general, however, they do not yield for so long a period. In certain cases, which must be considered as exceptional ones, 104 quarts of sap have been obtained in twenty-four hours, yielding nearly five pounds of crystallized sugar. But a maple of ordinary dimensions yields, in a favourable season, 113 quarts of sap, yielding five and a half pounds of sugar. This is considered as the average annual produce of a tree.

We may therefore conclude that the sap generally contains about two and a half per cent. of sugar. It is stated that the *Acer saccharinum* becomes more productive by cultivation. Thus the maples of the forests which have been isolated by removing the surrounding trees, which intercepted the sun's rays, and still more those transplanted into gardens, have yielded a richer and more abundant sap, containing as much as three per cent. of sugar.

The extraction of the sugar from the sap of the maple presents nothing remarkable. A method is followed analogous to that adopted in the case of cane juice. It ought to be soon boiled, as it alters and ferments very rapidly—so much so, that in many parts of the United States an alcoholic liquor is made, analogous to that yielded by the juice of the cane which has undergone fermentation (the *Flangourin* and *Chicha* of South America). In the preparation of maple sugar a notable quantity of molasses is obtained, caused by the abundance of soluble salts existing in the sap. We know also that the ash obtained by burning the maple is very rich in potash. The sap contains acetate, muriate, and sulphate of potash, acid phosphate of lime, and magnesia.

The formation of sugar does not take place in the roots of the maple, but in the ligneous parts. The sap is found to be richer in sugar the higher it is in the tree, up to a certain point, beyond which it is constant.

Crude maple sugar is of a brownish colour; it contains a small quantity of mannite. This mannite is especially found in the molasses of this sugar containing saline matter. This sugar is not refined, it is consumed in the localities in which it is produced, and there would be great loss in the process of refining. The manufacture adopted is a rude one, being conducted in the forests themselves, in the open air, in iron pans, containing about 100 quarts each.

The manufacture of this kind of sugar is a great resource for new settlers in the countries where the sugar maple grows abundantly in the forests, but it is evident that this method of procuring sugar can only be successfuly followed in certain localities, far removed from centres of population, where it may be substituted for cane-sugar by the inhabitants of those localities.

Beverley, in his history of Virginia, states, that the Indians made maple sugar before this country was occupied by Europeans; others, on the contrary, affirm that it was quite unknown to them, or at any rate that certain tribes were not acquainted with it.

Maple sugar has been made for many years in the United States.

The	State	of	Ohio	produced	3,033,806 lbs. of this sugar.
"	"		Kentucky	"	2,471,647 " "

In 1840, the total quantity of this sugar produced in the United States rose to 35,105,705 lbs.

In 1844, four States of the American Union, Indiana, Ohio, Vermont, and New York yielded more than 25,000,000 lbs maple sugar. The produce varies according

to the seasons. In the north and west States united, the annual produce may amount to as much as from 35,000,000 lbs. to 40,000,000 lbs., and the molasses to from 600,000 to 700,000 gallons. These returns, however, are rather uncertain, as we cannot place full reliance on the official reports.

In 1850, the United States only produced 34,253,436 lbs. of maple sugar. The molasses furnished by the sugar amounted to about 626,000 gallons.

This year, 1857, as cane-sugar and molasses are high in price, it is to be anticipated that there will be an abundant supply of maple sugar if the season be a favourable one. It is towards the end of February, March, and April, when the sap rises, that the operation is performed. We will now give the names of those States which produce the sugar of the maple.

Maine.—The counties of Arostok, Franklin, and Oxford, are those which produce the largest quantities of maple sugar, nevertheless, it is made in small quantities throughout the entire State, for the use of the inhabitants; 93,542 lbs. were produced in 1850.

New Hampshire.—The counties of Cheshire, Coos, Grafton, and Sullivan are those producing the most maple sugar in this State, but it is made throughout the State. Each inhabitant of the country or forest makes sufficient for his own consumption. In 1850, 1,298,863 lbs. were made.

Vermont.—All the counties of the State of Vermont produce maple sugar; in 1850 this State made more than 6,349,357 lbs. of this sugar.

Massachusetts.—The counties of Barnstaple, Franklin, Hampden, and Hampshire, are those which produce the most sugar. More than half of the other counties in this State do not produce any. In 1850, 695,525 lbs. were made.

Rhode Island.—The county of Providence produced only 28 lbs. of maple sugar in 1850.

Connecticut.—The county of Lichfield alone produced 44,477 lbs. Further quantities were produced by other counties.

New York.—Maple sugar is made throughout nearly the whole of the State of New York. The county of St. Lawrence alone made 1,236,504 lbs. This State made 10,357,484 lbs. in 1850.

New Jersey.—The county of Sussex made, in 1850, 1360 lbs. of maple sugar, which was more than half of the entire quantity produced in the State. The total quantity was 2197 lbs.

Pennsylvania.—More than three-fourths of the counties in this state make maple sugar. In 1850, 2,326,525 lbs. were produced.

Delaware.—No maple sugar is manufactured in this State.

Maryland.—Alleghany is the only county making maple sugar. In 1850, 47,740 lbs. were produced.

District of Columbia.—No maple sugar is made in this State.

Virginia.—A great number of the counties in this State produce maple sugar, although fully one-half do not do so. In 1850, 1,227,665 lbs. were produced.

North Carolina.—This State produces but little maple sugar, it being only made in three or four counties. In 1850, 27,932 lbs. were produced.

South Carolina.—Maple sugar may be said not to be produced in this State. In 1850 the county of Barnwell made only 280 lbs. of it.

Georgia does not produce maple sugar in quantity, 50 lbs. only having been made, in the county of Sumter, in 1850.

Florida does not produce maple sugar.

Alabama.—A very small quantity only is made in some counties in this state. In 1850, 643 lbs. were produced.

Mississippi does not produce this sugar.

Louisiana produced only 250 lbs., in one of the counties, in 1850.

Texas does not produce this sugar.

Arkansas.—The county of Madison made three-fourths of the maple sugar produced in this state. In 1850, the quantity produced was 9330 lbs.

Tennessee produced 158,557 lbs. in 1850. A great number of the counties furnished only small quantities. The country people make their own yearly supply.

Kentucky.—Nearly all the counties in this State furnish maple sugar in small quantities. In 1850, the quantity produced was 437,405 lbs.

Missouri.—Three-fourths of the counties in this State produce maple sugar, but in small quantities. In 1850, the quantity produced was 178,910 lbs.

Illinois.—Maple sugar is made in nearly all the counties in this State. In 1850, the quantity produced was 248,904 lbs.

Indiana.—Nearly all the counties in this State make maple sugar. In 1850, nearly 3,000,000 lbs. were made here.

Ohio.—Generally, all the counties in this State make maple sugar. In 1850, 4,588,209 lbs. of it were made.

Michigan.—Nearly all the counties in this State produce maple sugar. In 1850, 2,439,794 lbs. were made.

Wisconsin produces a considerable quantity of maple sugar. The counties of Crawford, Washington, and Sheboggan have furnished the most. In 1850, the quantity produced was 610,976 lbs.

Iowa.—A great number of the counties in this State produce maple sugar, but only in small quantities. In 1850, the quantity was 78,407 lbs.

California does not produce maple sugar. The territory of Minnesota produced 2950 lbs. in 1850.—*Journal de Pharmacie.*

IMPROVEMENTS IN THE MANUFACTURE OF SULPHATE OF ALUMINA AND ALUM.

BY MR. H. D. POCHIN.

The following processes, which were patented in 1855 and 1856, are now successfully applied in the manufacture of aluminous salts. In his first patent, Mr. Pochin says :—

"I take clay composed of various quantities of silica, alumina, iron, and water, or clay without iron, when it can be had. I find that I can use with advantage and economy that containing about 45 of silica, 37 of alumina, .3 of oxide of iron, and 17.7 of water in 100 parts. Such clay I first dry by subjecting it to heat, so as to get rid of a portion of the moisture, and fit it for grinding, and then I proceed to grind it to a moderately fine powder in an ordinary clay mill or other suitable apparatus for grinding clay. The clay thus prepared I subject for about two hours to the action of heat in a reverberatory or other convenient furnace, during which time it is to be well stirred, until the whole of the water has been evaporated, and the powder brought into a condition to be easily acted upon by sulphuric acid, which may be known by treating a small portion of it in a platinum crucible with sulphuric acid of a known specific gravity and then subjecting it to heat, and afterwards dissolving it in a known quantity of water, and ascertaining the specific gravity of the solution, which should be so high as to indicate the absence of any free or uncombined sulphuric acid. This powder is then passed through a fine sieve, of about 80 meshes to the square inch. One ton of it is intimately mixed with 21 cwt. of sulphuric acid, having a specific gravity of about 1735, and afterwards as much water added as would reduce the specific gravity of the sulphuric acid employed to about 1350. It is then placed in a leaden or other suitable vessel, and steam or fire heat applied, being well agitated until it reaches a temperature of 212° Fahr., when the greater part of the sulphuric acid combines with the alumina of the clay, causing a violent action. It is then continued at a boiling temperature for about four hours, so as to ensure the combination of the whole of the acid with the alumina. This may be determined by any of the ordinary tests ; but I prefer to use for this purpose a solution of caustic ammonia of a known strength, until an alkaline reaction is obtained, which is shown by the application of litmus paper to the solution. The fire is then withdrawn, and the mass removed and allowed to cool. This compound I term aluminous cake ; it contains but little more than the silica originally in the clay, and the sulphate of alumina formed by the action of the sulphuric acid on the alumina, and no free or uncombined acid. I employ the aluminous cake obtained in manner above described, in the manufacture of the aluminous mordants used by calico printers and dyers, and in various other processes used by dyers ; and in the preparation of white leather, in the process termed tawing; also in the manufacture of paper as a substitute for alum, and the ordinary sulphate of alumina. And in the application of this aluminous cake for such purposes, it is not necessary to separate the silica and the small excess of clay which may have been used for the aluminous cake by any of the expensive processes, such as lixiviation and evaporation, which have hitherto been adopted in the preparation of the sulphate of alumina of commerce."

A further improvement is specified in the second patent, as follows:—

"By the methods hitherto in use for roasting clay and other minerals containing variable proportions of silica and alumina, a part only of the alumina contained in the minerals so treated will combine with acids. Now, I have a method of treating a mineral consisting of alumina and silica without iron, so that the whole of the alumina of the minerals containing variable proportions of silica and alumina shall combine with acids. For this purpose I take a mineral consisting of some proportions of silica and alumina, such as the mineral known as china clay, and dry it well by exposure to heat for some time in any convenient manner; I then grind such mineral to powder in an ordinary clay or other suitable mill, and afterwards mix it well together with one or more of the following substances, namely, powdered charcoal, peat, pitch, pitch-coke, that is to say, coke from pitch, soot, sawdust, spent dye-woods, or other carbonaceous matters which leave little ash and no iron after combustion. I find that about one part by weight of powdered charcoal will do to burn with about six parts of clay; and when I employ pitch I find it desirable to use about three parts by weight of clay and one part of pitch; and with sawdust, spent dye-woods, and other such matters, equal weights of clay and those substances, but I do not confine myself to those proportions. I then heat in a reverberatory or other furnace, which will supply oxygen to the roasting substance, the clay so prepared, until the whole of the carbonaceous matter has been burnt away, which should be done by keeping the furnace at a dull red heat, and will occupy about an hour and a half. The mineral prepared by the above method can be employed with advantage in the manufacture of aluminous cake, pure sulphate of alumina, the alums of commerce and other aluminous compounds, whilst the silica afforded can be used for those purposes for which pure silica is required.

ON THE VITALITY OF SEEDS TRANSPORTED BY MARINE CURRENTS.

BY M. C. MARTINS.

Botanists, struck by the facts establishing the transport of seeds by marine currents, have thought that the latter must have played a great part in the diffusion of the disjoined species of plants which form isolated colonies upon islands or continents separated by vast extents of sea. Geologists, surprised at the uniformity of the vegetation of the great archipelagos scattered in the ancient seas, were still more disposed to consider marine currents as the principal agents in the dissemination of seeds upon the surface of the globe. These *à priori* conclusions have never been directly verified by experiment: it has never been tried (1) whether many seeds are sufficiently light to float upon salt-water; and (2) whether these seeds, after floating for a long time at the surface of the sea, still retain their germinative faculty.

To settle this question experimentally, the author selected some fresh seeds of which the germination never fails, taking them from the principal families, and generally preferring those of large size, furnished with a hard and thick episperm, or those of littoral plants. The former should resist the action of salt-water, from their volume and the impermeability of their envelopes; the other should have more chance of germinating if they fell upon a sandy shore.

Of 98 species, 55 floated, and 39 were specifically heavier than the water of the Mediterranean, the density of which off Cette is 1.0258. Four seeds had a specific gravity equal to that of salt-water: these are, *Nelumbium speciosum*, *Datura Stramonium*, *Juglans nigra*, and *Gingko biloba*. Thus, of a certain number of seeds taken by chance, we may say that two-thirds float.

To try the action of sea-water upon floating seeds, the author endeavoured to place them in the same physical conditions to which they would be subjected when floating at the surface of the sea. A wrought-iron box, measuring 0.30 m. square by 0.03 m. in depth, divided into 100 equal compartments, received 98 species of seeds; each compartment contained 20 seeds of the same species. Of some large seeds there were only 6, 12, or 18, and of the small ones a large pinch was put in. The lid was then soldered on, and the walls of the box pierced with small holes, through which the water would pass easily.

The apparatus was fixed upon a buoy at the entrance to the harbour of Cette. By the rising and falling of the buoy, the box was alternately raised out and immersed in the water, so that the seeds were exposed to the action of air and water, as if they

were floating on the surface of the sea. The box remained attached to the buoy from the 14th February to the 1st April, 1856, or for six weeks; 41 of the 98 species of seeds were completely rotten. The other 57 were immediately sowed in pots of turf-mould, and placed under frames. Only 35 germinated, and from these 17 must be deducted, which being heavier than salt water, could not have floated at the surface; this reduces to 18 the number of seeds which, after six weeks of floating, would be capable of germinating when placed in the most favourable circumstances. These are—*Cakile maritima*, *Nelumbium speciosum*, *Linum maritimum*, *Paliurus aculeatus*, *Cucurbita pepo*, *Eryngium maritimum*, *Scabiosa maritima*, *Xanthium macrocarpum*, *Asclepias Cornuti*, *Rumex aquaticus*, *Salsola Kali*, *Beta vulgaris*, *Euphorbia paralias*, *Ricinus communis*, *R. africanus*, *Gingko biloba*, *Ephedra distachya*, *Pancratium maritimum*, and *Asphodelus cerasiferus*. These are the species which, after a navigation of six weeks, would have had some chance of establishing themselves upon the shore.

Six weeks being a very short time compared with that which some seeds must occupy in their voyage from one continent to another, the author resolved to replace in the sea the 35 seeds which had germinated after six weeks' exposure; of each of these 20 were placed in the same box, which was fastened to the buoy on the 17th June, 1856, and remained attached to it until the 18th September, that is to say, 93 days, or three months. At the end of this period, 11 seeds were rotten. The remaining 23 were sowed under frames, when 9 germinated; but from these two must be deducted, viz., *Acacia Julibrissin* and *Canna gigantea*, which do not float upon sea-water. There remain, therefore, 7 species which might float upon the surface of the sea for three months without losing their germinative power, and these are only $\frac{1}{17}$th of the total number operated upon. They are, *Cucurbita pepo*, *Xanthium macrocarpum*, *Rumex aquaticus*, *Beta vulgaris*, *Ricinus communis*, *R. africanus*, and *Ephedra distachya*.

Considering the extraordinary concurrence of circumstances necessary to enable a seed thrown upon a shore to fructify and become the centre of a vegetable colony, we may conclude with Alph. de Candolle, that this mode of transport, which is so frequently referred to, can have taken only a very small part in the diffusion of the plants of the present and geological epochs; and yet the number of identical species separated by vast seas, and which marine currents alone could have transported from one continent to another, is so considerable, that the idea of the multiplicity of the centres of creation will every day acquire more probability.—*Comptes Rendus*, 24 Aug. 1857, p. 266, *as translated in the Annals of Natural History.*

ON THE DRYING OF PLANTS FOR THE HERBARIUM.

BY MR. CHAS. WRIGHT.

A BOTANICAL voyager and traveller, whose explorations have extended over a large portion of the new United States' territories (New Mexico, Texas, California) into Japan, &c., and more recently into the mountain districts of Cuba, Mr. Charles Wright, whose experience consequently entitles him to attention, and whose specimens confirm the excellence of his practice, suggests improvements in the ordinary method practised by the English botanists in drying plants for the herbarium.

He writes, in a letter from Santa Catalina de Guarsa (Cuba), May, 1857:—

"Allow me to suggest that you alter your directions* for collecting plants in one particular, and substitute for the tin box or vasculum, one or two portfolios that will hold each four to six quires of thin, firm paper. I have tried both methods, and without wishing to arrogate to myself superior knowledge or skill, I am perfectly satisfied that one who collects with portfolios can do more and better work by one-third than he who collects with a tin box. Any person who collects a large-flowered *Convolvulus* in a tin box, and who succeeds in making even a tolerable specimen of the flower, has a greater stock of patience than I can boast of. In another particular I think your directions capable of improvement. Instead of pressing my specimens on the outside of the sheets of paper, I put my specimens *within* a sheet of paper, one or two, if large, and many, if small, *and never move them from within that sheet till they are dry.* Thus then there is no risk of breakage, which

* This alludes to "Directions" printed and circulated by the Royal Gardens of Kew, for the use of travellers and those herborizing in distant countries.

will inevitably happen in some cases during the process of drying, if they are removed from one paper to another, especially such as are resinous or milky. I have also used during the past winter a very thin paper of small size for the collection of Mosses, *Hepaticæ*, and other very small or delicate plants, and have found it very convenient. I could thus keep perfectly distinct twenty or thirty species of these little plants, besides gathering four or five quires-full of larger plants in a day's excursion; I cannot imagine how I could have done it with a vasculum. I carry, in my portfolio, a piece of thin India-rubber cloth for its protection in case of rain.

"I also employ a peculiar method for making handsome specimens of such succulent plants as *Portulacaceæ*, *Piperaceæ*, Orchids, &c., though it may be no new thing to others. As soon as possible after such plants are collected, I pass over them a hot flat-iron, thus partially scalding them; they then dry rapidly; the parts adhere together as well as any plants, and they preserve almost entirely their colour; some do so perfectly. I would advise a collector, especially one going to tropical countries, to provide himself for this object with a plate of copper half an inch thick, of convenient size, round, or square, or oblong. I would prefer copper, because it retains its heat much longer than iron, and does not rust. I imagine this method might be successfully employed in drying Agarics."—*Hooker's Journal of Botany.*

SOFT SULPHUR FOR STOPPING TEETH.

M. H. Henriot has successfully employed soft sulphur as a substitute for the numerous cements used for decayed teeth. This substance, which acquires in a little time after its introduction in the cavity a considerable degree of hardness, is insoluble in all bodies in the cold. It is not attacked by any of the alimentary substances or dentrifices, and is easily and quickly applied. All that is necessary is to put some fragments of sulphur, or better, some washed flowers of sulphur, in a glass tube, sealed at one end, heat it over a spirit lamp, and pour into cold water. The sulphur should be heated to a temperature above 390° F., when we obtain, on pouring into cold water, a spongy mass, brown, soft, and elastic, which is called soft sulphur. It is known that the melted sulphur, if the temperature is sufficiently high, becomes thick and viscous, which is then again rendered fluid. The preparation thus obtained is introduced in the form of little balls, which are pressed into the decayed tooth. The soft sulphur may be prepared in two minutes. —*Journ. des Connais. Méd.*

PROTOSULPHATE OF IRON WITH SUGAR.

It is extremely difficult to prevent the oxydation of sulphate of iron, nevertheless in chemical research, and for use in Pharmacy, it is important to have a pure protosulphate of iron. According to M. E. Latour, Pharmacien Aide-major, the addition of sugar preserves this salt from alteration. M. Latour has shown, moreover, from careful analysis, that this salt crystallizes with sugar in a regular manner and of a definite composition. It is prepared in the following manner:—

200 parts of pure protosulphate of iron are dissolved in 100 parts of boiling distilled water; 50 parts of crystallized sugar (sugar candy) are also dissolved in 30 parts of boiling distilled water. On mixing the liquors and rapidly filtering, crystals are deposited between 95° and 100° F. These crystals, collected and dried between folds of blotting-paper, should be preserved in a dry bottle. By concentration, a fresh quantity of this salt may be obtained. The crystals are oblique rhombic prisms, having the composition—

Protosulphate of iron	54.57
Water	32.5
Sugar	12.93
	100.00

—*Gazette Médicale de l'Algerie.*

ELECTRIC TELEGRAPHING BY STEAM.

It might puzzle the most speculative philosopher, or the most profound mechanist, to say from which power, steam or electricity, the greatest amount of benefit is likely to result to mankind. Steam has already done wonders; though, in spite of the oft-repeated saying that "it is still in its infancy," there seems reason to believe that already have we nearly approached the wide limits of what can be effected by that power. With electricity, on the contrary, the field that is gradually expanding before the inquiries of men devoted to that branch of science, seems almost as boundless and as universal as the electric fluid itself. That electricity has done something of late may be admitted now, even though, according to all appearances, the result of a few more years of progress on the electric science, and the discovery of its applicability to a number of uses now only dimly foreshadowed, will soon make our present attainments appear as nothing. But though the merits of each agency are sought on all sides to be carefully developed, and a rivalry of progress is perpetually being instituted, yet the greatest achievement of all, a simple plan to combine both powers, has never been successfully attempted until now. With the telegraph electricity has surpassed steam, and there are wise and able men in this metropolis now labouring hard to perfect a grand conception, and by the establishment of one strong electro-motive power, supersede the use of steam in machinery for evermore. This is a great idea, but perhaps a perfect and harmonious union between electricity and steam is a greater still. The first step in that union, which must yield to mankind and civilization the most important and valuable results, has been made by Mr. Boggs, a gentleman whose name has long held honourable place among our electricians, and who has now divined a plan by which even the electric current may be quickened, and the speed of the electric telegraph stimulated a thousand-fold. In inventions of this kind there is nothing more difficult than to convey to the general reader a clear impression of the value of an improvement, to understand every step in the detail of which requires knowledge more or less intimate of the science of electricity as applied to telegraphic purposes. We shall therefore merely state, in the most general manner, the nature of the plan proposed by Mr. Boggs, without at all stopping to inquire into the reason for the effects produced. In order, however, that our readers may appreciate the value and nature of the improvement, it is necessary briefly to state, first, the routine by which telegraphic messages are at present conveyed, and the difficulties which hourly occur in their transmission. Electric telegraphs of all kinds are either worked by voltaic or magnetic electricity, the current of which along the wire is alternately transmitted and broken, according as the circuit is completed or interrupted, by means of a handle, which is worked by a clerk. This alternate transmission and release of the voltaic or magnetic current deflects the needle at the other end of the wire either to the right or left, or registers the message by electro-magnetism, according to the nature of the instrument employed. As a matter of course, while a message is being thus slowly transmitted as it were by hand, the whole length of the wire is entirely occupied, while, whatever the emergency, nothing can be done towards forwarding the messages which are to follow until the wire is entirely unoccupied and reported free. Where needle instruments are used, messages can be transmitted with comparative rapidity; but this advantage is more than counterbalanced by the danger of inaccuracy, and which can only be guarded against by a repetition of all important messages. Such a repeating process naturally causes a certain loss of time, though even with this drawback it is equal in rapidity to the recording telegraph, but never so certain in its operation. Experience of these matters enables the telegraph companies to ascertain to a single word the number of messages that can be transmitted daily with the wire in full operation; and their charges, therefore, are regulated not according to the cost at which each message can be sent, but according to a scale which not only repays the working expenses of each day, but each day's interest on the whole amount of capital embarked in the undertaking. So, then, if any process be discovered by which a message that now occupies an hour in its transmission can be sent in five minutes or less, the sender would gain the difference, and only pay for the occupation of the wire for one-twelfth of the time, and therefore one-twelfth of the amount at present charged. To charge by words is only a more certain method of charging by time, and of course, if any company suddenly found itself in a condition to transact one

hundred times the amount of business in the same period and at the same cost that it at present incurs, the gain to the public would be an immediate reduction to nearly one-hundredth of the rate now charged for telegraphic messages. It is this great change which Mr. Boggs's invention proposes to effect—to work the electric telegraph by steam, and so get over the great obstacle which now exists against its more general use—namely, its slowness. It may seem paradoxical to speak of the slowness of the electric telegraph as being the only bar to its more general adoption, but in truth such is the literal fact ; for the time occupied, and therefore expense incurred in using the telegraph wire, makes a message rather the resort of commercial or domestic emergency than a thing of daily use, almost rivalling the post as a means of daily communication. The invention, then, which is to supersede these tedious processes, and work the telegraph by steam instead of by hand, is generally as follows :—A series of gutta percha bands, about six inches wide and a quarter of an inch thick, are coiled on wheels on drums arranged for this purpose. These bands are studded down both sides with a single row of holes at short intervals apart. When a message is to be sent, the clerks wind off these bands, inserting in the holes small brass pins, which, according to their combinations in twos and threes (with blank holes between), represent certain words or letters. In this manner the message is, as it were, "set up" in the bands with great rapidity; and if the number of bands employed is sufficiently large—say as numerous as the compositors employed in a large printing-office—messages equal in length to five or six columns of this journal could be set up and ready for transmission in the course of a single hour. Of course this operation in no respect interferes with the telegraph wire itself, which continues free for use until the bands of messages are actually being despatched. The gutta percha bands when full are removed to the instrument-room, a most simple appliance, preventing any derangement or falling out of the pins while being moved about. In the instrument-room the bands are connected with ordinary steam machinery, by which they are drawn in regular order with the utmost rapidity between the charged poles of an electrical machine, in such a manner that, during the moment of each pin's passing, it forms electrical communication between the instrument and the telegraph, and a signal is transmitted to the other end of the wire, where the spark perforates a paper and records the message. The only limit to the rapidity of the operation is the rate at which the bands can be drawn, since the electrical contact of each pin, even for the two-hundredth part of a second, is more than sufficient to transmit a word or signal from London and register it in America. Of course, as the message is recorded, we will say in America, with the same rapidity as that in which it is transmitted in London, a number of reading clerks will be requisite, in order to translate it, by dividing it into small portions, with almost as much facility as it has been sent.

The value and importance of this invention, not only to the public, but to telegraph companies themselves, must be evident to the least experienced in such matters; in fact, without it, long submarine lines would be all but impracticable from the slowness of the process, and consequently from the expense attendant upon transmitting the briefest message. It is now tolerably well known that, had the attempt to submerge the Atlantic cable been successful last summer, one submarine wire would not at the most have sufficed for the transmission of more than a small number of messages per diem each way, and that in fact all that it could have transmitted would not have met one-twentieth of the demand from either country. So clearly was this foreseen, that even before one cable was laid it was contemplated to submerge a second cable, one for messages to England, and the other for messages to America. By the new patent for steam telegraphing which we have mentioned, worked with an efficient staff, it would be perfectly easy for one wire to transact all the business between England and America. With proper arrangements an hour would suffice to transmit intelligence equal in number of words to the contents of twelve columns of the *Times*. It is no exaggeration, therefore, to say that the most important news in each country, with a price-list extensive enough to include every staple of trade, might be exchanged in time for the commencement of business in the capitals of the Old and New World. Another of the great advantages which the invention possesses is the application of static electricity to telegraphic purposes. To obtain intensity of the electric fluid without quantity, has always been regarded among electricians as the great desideratum for the telegraph. In this both voltaic and magnetic currents are wanting, quantity with them being inseparable from

intensity. In long, and, of course, therefore, in submarine wires, quantity in the voltaic current becomes a dangerous obstacle, always creating an induced current in an opposite direction to that in which the message is sent, charging the wire and generally exercising that dreaded retarding influence about the real cause for which so many different opinions exist. To overcome these impediments many efforts have been made to apply static electricity to the telegraph, but till now the attempt has always been unsuccessful. Mr. Boggs produces his power with ordinary plate machines, which are turned of course by the same machinery as that which winds off his gutta percha message bands. The most simple and ordinary plan provides for the poles of the machine being at all times kept equally and properly charged, no matter at what speed the pin bands may be passing between them, and the force of the discharge being sufficient to pierce the paper and register the signal at the end of the wire, no electro-magnetic coil is necessary at the end of the circuit. It is needless to point out the advantages which this plan possesses on the score of economical production of the current, or its greater certainty of passage along a wire when (especially in long submarine cables) it would encounter many slight defects and attenuations almost fatal to the progress of a magnetic or voltaic current. In these remarks we have merely pointed out the most prominent features of the new plan, enough to enable those interested in the subject to recognize the ease and certainty with which the improvements may be carried out, and the vast importance which must result to the community from their general adoption. In the value of the invention and the results which it promises, it is second only to the great discovery of the electric telegraph itself, which can be fully utilized only by this process. The discovery has only been a short time patented, since which Mr. Boggs has been employed in perfecting by practice the minor details of his plan. A company is about to be formed to apply and carry out the invention in a more extensive manner than can be achieved by the efforts of a private individual, however energetic. There is apparently little doubt, from the value of the plan, and the necessity which exists for its adoption, that the company will be as successful as the improvement it recommends.—*Times*, Nov. 7.

SCIENTIFIC MEETING IN GERMANY.—THE ELECTRIC TELEGRAPH.

At a meeting of German naturalists and physicians held this year at Bonn, Dr. Hamel, of St. Petersburg, delivered a discourse, in which he endeavoured to trace the history of the invention of the electric telegraph. The first telegraphic apparatus worked by galvanism was that exhibited by Soemmering on the 29th August, 1809, before the Academy of Sciences at Munich, in which the mode of signalling consisted in the development of gas bubbles from water placed in a series of glass tubes, each of which denoted a letter of the alphabet. Baron Schilling, attached to the Russian embassy at Munich, was a particular friend of Soemmering's, and a frequent visitor at his laboratory in 1807 and 1808, when he was occupied with his galvanic telegraph. When Oersted, in 1820, published his important discovery, it occurred to Schilling that the instant declination of the magnetic needle on the application of a stream of galvanism through a surrounding wire might be applied to telegraphic purposes; and although Ampère, no doubt, so early as the autumn of 1820, had announced an application of Oersted's discovery to telegraphy as something that was perhaps possible, Schilling was the first to realize the idea by *actually producing* an electro-magnetic telegraph, simpler in construction than that which Ampère had *imagined*. By degrees he succeeded in producing an apparatus with which, by means of a wire several (German) miles long, he was able successfully to transmit electro-magnetic signals, previously sounding an alarm when required. His journey to Mongolia (commenced in May, 1830) interrupted for a time his telegraphic labours, but he speedily resumed them upon his return home in 1832. The services of Professor Weber of Göttingen in the same cause in 1833, Dr. Hamel passed over as already known to his auditory. In May, 1835, Baron Schilling left St. Petersburg on a tour through Germany, France, and Holland, and he attended the meeting of German naturalists which took place that year in Bonn. At the sitting of the Physical Section on September 23rd, of which the president for the day was Professor Muncke of Heidelberg, Schilling exhibited and explained his telegraphic apparatus, with which Muncke was greatly taken. He frequently spoke of it after his return to Heidelberg, and on the 6th March following (1836) he explained

the whole thing to William Fothergill Cooke, who was then occupied at the Anatomical Museum, with Professor Fiedemann's sanction, in the preparation of wax models for his father, then recently appointed Professor of Anatomy in the University of Durham. Cooke, although he had never previously studied physics or electricity, was so struck with what Muncke told him, that he instantly resolved on abandoning the work he was engaged on, and on endeavouring to introduce electro-magnetic telegraphs upon the English railways. With this object in view he reached London on the 22nd April. On the 27th February, 1837, he became acquainted with Professor Wheatstone of King's College; and early in May the two gentlemen resolved to labour in common for the introduction of the telegraph into England—an object which they successfully accomplished. On the 12th June they obtained their patent, and on the 25th July the first trial was made at the London terminus of the North-Western Railway, with a wire a mile and a quarter long. About a fortnight previously, Steinheil of Munich had placed the buildings of the Academy of Sciences in electric communication with the Observatory at Bogenhausen; and his discovery, the following year, of the possibility of bringing the galvanic current, in telegraphing through the earth, back to the battery, deserves greater recognition than it has yet received.

Schilling, on his return to St. Petersburg, had renewed his efforts to turn his telegraph to useful account with more energy than ever. After a series of experiments, he believed he had succeeded in effecting a sufficient isolation of the conducting wire to admit of the transmission of signals through water, and he proposed to unite Cronstadt by means of a submarine cable. He had got a rope prepared with several copper wires isolated agreeably to his instructions, when death put a stop to his labours, on the 7th August, 1837.

In the course of the summer of that year intelligence reached America of what had been done in Germany and England in the way of electric telegraphy. This news stimulated Samuel F. B. Morse to construct, with the assistance of Dr. Gale, Professor of Chemistry, an apparatus with which he hoped to be able to telegraph. The subject was not at that time quite new to Morse. He had been twice over in Europe to improve himself in his profession as a painter, and in the course of his second homeward voyage, in 1832, he had had his attention awakened to the possibility of electro-magnetic telegraphy by Dr. Jackson, his fellow passenger on board the Sully. On the 4th of September—a month after Schilling's death—he made what he termed a "successful attempt." The speaker was in possession of a sketch prepared by Morse himself of the apparatus with which this successful attempt was effected. By means of a set of flat toothed types there was impressed upon a sheet of paper, moved horizontally over a cylinder, a set of zigzag marks like the teeth of a saw, which were meant to denote figures. In this manner a set of numbers was presented to the eye, each denoting a certain word or number, for the ascertainment of which the receiver of the despatch required to consult a voluminous dictionary. The strip of paper operated upon on the 4th September, 1837, represented, in teeth shaped somewhat like the letter V, the following numbers, viz.:—215, 36, 2, 58, 112, 04, 01837; which, according to the dictionary, denoted "Successful experiment with telegraph, September 4, 1837." This cumbrous process, of course, never came into actual use; but, notwithstanding this, Morse boldly terms himself the inventor of electric telegraphy, and dates his invention from the year 1832. Nay, more, the Supreme Court of the United States pronounced a judgment in 1854, finding that in this respect he had the priority of all Europe. It may possibly be worth while to observe that Morse is not, as seems to be commonly supposed, a professor of physics. In 1835 he was appointed "Professor of the Literature of the Arts of Design" in the educational institution termed the University of New York; but he never delivered a single lecture. The instrument now known by the name of Morse's Telegraph was brought to perfection by degrees, long subsequently to 1837, and after Morse had made two more voyages to Europe.

In November, 1839, Cooke and Wheatstone executed in London a contract of copartnery, and on the 12th December they gave in their specification. Their process was founded essentially on the same principle as Schilling's, only giving the needle a vertical instead of a horizontal position. In August, 1839, there were completed thirteen miles—namely, from Paddington to Drayton—of a telegraphic line along the Great Western Railway, then in progress. Other extensions followed,

and in 1845 Cooke suddenly received commissions for a number of lines in various directions throughout the country. The telegraph had received a sudden accession of popularity from the aid it had afforded in the discovery and apprehension of John Tawel, the murderer. In 1846, Cooke succeeded in forming the Electric Telegraph Company, which afterwards amalgamated with the International. Their head station is at Lothbury, and down to the present day most of the apparatus employed by them are constructed on the principle originally applied by Schilling, though now greatly improved by Wheatstone. From these apparatus proceed 150 different wires at the least, which run below the pavement to various localities.

Thus it was Baron Schilling of Lanstadt who was the first man by whom electro-magnetic telegraphy was really applied; and it was the telegraphic seed from St. Petersburg which, after finding its way *viâ* Bonn and Heidelberg to England, struck its roots in London—roots from which a tree has sprung up whose gigantic branches, laden with golden fruit, now stretch and ramify over land and sea.—*Scotsman.*

SCIENTIFIC MISSION TO INDIA.

An important paper has just been read to the Academy of Sciences on a mission sent to India and Upper Asia in 1854 by the King of Prussia and the East India Company. The members of the mission consisted of three brothers, MM. Herrmann, Adolphus, and Robert Schlagentweit, two of whom, MM. Herrmann and Robert, returned in June last; the third, M. Adolphus, is still among the Himalaya mountains, and is expected soon to return, *viâ* the Punjab and Bombay. During the winter of 1854-55, these enterprising travellers visited the region lying between Bombay and Madras; in the following summer M. Herrmann explored the eastern parts of the Himalaya, the Sikkim, Bhootam, and Kossia mountains, where he measured the altitudes of several peaks. The highest of all the summits known throughout the world, appears by his measurements, to be the Gahoorishanka, situated in the eastern portion of Nepaul—the same announced as such by Colonel Waugh, but called by him Mount Everest, because he had been unable to ascertain its real name in the plains of Hindostan, where he effected his measurement. This peak is somewhat more than 29,000 English feet in height, and bears another name in Thibet, where it is called Chingopamari. The other two brothers, MM. Adolphus and Robert, penetrated by different roads into the central parts of the Himalaya, Kumaon, and Gurwahl; they then visited Thibet in disguise, entered the great commercial station of Gartok, explored the environs of Lake Mansarowr, and that remarkable crest which separates the waters of the Indus from those of the Dihong, often erroneously called the Burrampooter. They ascended the Ibi-Gamine, 22,260 feet in height, that being an altitude never before attained in any part of the world. After having been separated from each other for a space of fourteen months, during which M. Robert ascertained that the table-land of Amarkantak, in Central India, which is generally stated to be 8000 feet above the level of the sea, is not more than 3300 feet in height, the three brothers met again at Simla, previous to commencing the operations intended for the summer of 1856. M. Adolphus, on leaving that place, crossed the Himalaya, went over Thibet, Baltistan, and visited the interesting spot where several mountain crests meet, and the Hindoo Koosh joins the range lying to the north of India. He then returned to the Punjab through the valley of Cashmere. MM. Herrmann and Robert proceeded to Ladak by different routes. Under good disguises, they were enabled to penetrate into Turkistan proper by crossing the Karakaroom and the Kuenluen mountains, and descending into the great valley of Yarkand, a region never visited before, not even by Marco Polo. It is a vast depression of between 3000 and 4000 feet, separating the Kuenluen on the northern frontier of India from the Syan-Chane, or mountains of Central Asia, on the southern border of Russia. They then returned to Ladak, and entered the Punjab by different routes through Cashmere. After a two years' negotiation, M. Herrmann was, at the commencement of 1857, admitted into Nepaul, where he determined the altitudes of the Machipoora and Mount Yassa, which have hitherto been vaguely called the Dhawalagery, which means nothing else but "snowy crests," and is applicable to all snow-capped mountains. M. Robert proceeded to Bombay through

Scinde, Kutch, and Guzerat; where he surveyed the chain called the Salt Range, and determined the changes effected in the course of centuries in the course of several rivers. Before returning to Europe, he stayed three months in Ceylon. M. Adolphus visited various parts of the Punjab and Cabul previous to returning to the Himalaya, where he still is. The chief results obtained from this careful exploration of Asia are the following :—The Himalaya mountains everywhere exercise a decided influence over all the elements of the magnetic force ; the declination everywhere presents a slight deviation, causing the needle to converge towards the central part of that enormous mass, and the magnetic intensity is greater than it would be anywhere else under an equal latitude. In the south of India the increase of magnetic intensity from south to north is extremely rapid. The lines of equal magnetic intensity have a remarkable form, similar and perhaps parallel to those of certain groups of isothermal lines. The three travellers have collected all the materials necessary to ascertain this important fact. Irregular local variations in terrestrial magnetism are rare in those regions. In the Deccan and Behar the rocks are magnetic. On the Himalaya, at altitudes of 17,000 and even 20,000 feet, the daily *maximum* and *minimum* variations of the barometer occurred nearly about the same hours as in the plains below. Again, at the above altitude, the inversion of the curves of daily variation which is met with on the Alps does not take place. At the altitude of 17,000 feet the diminution of transparency produced by a stratum of air of the thickness of 3000 feet is no longer distinguishable by the eye. During the dust storms which frequently occur in India the disk of the sun is seen of a blue colour ; if small bodies are made to project their shadows on a white surface under such circumstances, the shadow is of an orange colour—that is, complementary to blue. The transparency of the waters of the Ganges, the Burrampooter, and the Indus was tested by letting down a stone into them, which generally became invisible at a depth of from 12 to 15 centimetres (5 to 6 inches), showing that they are overcharged with earthy particles, for in the sea near Corfu a stone is visible to the depth of 50 feet, and in the seas under the tropics it remains visible at a depth of 30 feet.—*Times*, October 23.

THE MEDICINE STAMP AND LICENCE ACTS.

[It seems almost useless to revert to this subject, it being evident that many Members do not read the articles that have been published. The following correspondence contains nothing which has not been repeatedly dwelt upon in this Journal ; but as the subject in this form may possibly attract the attention which, if embodied in an article, it would not receive, we are induced to insert it :—]

(Correspondence.)

"*Inland Revenue, Somerset House, London, W.C.,*
25th Sept., 1857.

"Sir,—I have to acquaint you that an information has been lodged at this office, for the purpose of a prosecution being commenced against you in the Court of Exchequer, for the recovery of a penalty of £10, incurred by you in respect of the offence against this Revenue, the particulars of which are specified on the other side. I give you this information, in order to afford you an opportunity of offering any explanation or statement of extenuating circumstances, with the view to induce the Commissioners of this Board either to forego the proceedings or to mitigate the penalty.

"Any representation which you may think proper to address to the Commissioners of this Board on the subject, may be transmitted to me ; but I must apprize you that the case admits of no delay, and that unless I receive a communication from you within a week, it will be my duty to cause you to be served with Exchequer process.

"I am, Sir, your obedient servant,

"J. Timm,

"*Solicitor of Inland Revenue.*"

"Particulars of offence :—Selling on the 27th August, 1857, an article (Gregory's Powder) chargeable with the Medicine Stamp Duty, without having a stamp thereto affixed. One penalty of £10."

"*Bradford, Sept. 26th*, 1857.

"Sir,—I am in receipt of yours this morning, informing me that I have incurred a penalty by selling Gregory's Powder without a stamp. In reply, permit me to state that this preparation is not a secret one, and a formula for it is given in the Edinburgh Pharmacopœia. My label also describes the composition, and it is, I believe, universally known and sold by that name. If I have erred, I beg to assure you I have done so in ignorance. I have referred to some extracts from the Act of Parliament respecting this, and I trust I am not liable to a penalty. I enclose you my two labels—one for bottles, the other for small paper parcels of it ; and may I ask the favour of your letting me know at your earliest convenience if they are not legal. "I am, Sir, your obedient servant,

"Michael Rogerson."

"*To* J. Timm, Esq., *Somerset House, London.*"

"*Inland Revenue, Somerset House, London,*
28th Sept., 1857.

"Sir,—In reply to your letter of the 26th instant, I have to inform you that it is not by reference to the label only, affixed to an article of medicine, that its liability or otherwise to stamp duty is to be determined. Every such article, which is held out by the makers, vendors, &c., by any public notice or advertisement, or by any written or printed papers or *handbills*, as being beneficial to the prevention, cure, or relief of any malady, ailment, disorder, or complaint incident to or in any wise affecting the human body, is declared liable to stamp duty. Such a handbill is published by you, in which the articles 'Dr. Gregory's Powder' and 'Essence of Jamaica Ginger' are respectively so held out, and which renders such articles liable to stamp duty. "I am, Sir, your obedient servant,

"J. Timm,
"*Solicitor of Inland Revenue.*"

"Mr. Michael Rogerson,
"*Chemist, Bradford, Yorkshire.*"

"*Bradford, Sept. 29th*, 1857.

"Sir,—I beg to acknowledge the receipt of your letter, and thank you for your prompt reply. I am glad to learn my Gregory's Powder labels do not lay me open to a penalty. I never did advertise in the way of business, nor publish handbills. I have some very *old catalogues*, which, on reference, I find describe some properties of Gregory's Powder, and also Squill and Lettuce Lozenges, which I discontinued to keep or sell ten or twelve years since. I claim no proprietary article ; my business is principally dispensing physicians' prescriptions, and selling drugs. I disclaim any intention of defrauding the revenue, and I trust you will give me credit for sincerity, when I state that I think I have not offended against the law.

"I am, Sir, your most obedient servant,

"Michael Rogerson."

"*To* J. Timm, Esq., *Inland Revenue, Somerset House.*"

"*Inland Revenue, Somerset House, London,*
1st October, 1857.

"The Attorney-General *v.* yourself.

"Sir,—The Honourable Commissioners of Inland Revenue have considered your statement, and have been pleased to mitigate the penalty incurred by you to the sum of £2, which must be paid to the collector of Inland Revenue at Halifax within ten days from this date, to prevent proceedings being continued to recover the full penalty. "I am, Sir, your obedient servant,

"J. Timm,
"*Solicitor of Inland Revenue.*"

ACCIDENTAL POISONING BY OPIUM.

Coroner's Court, Liverpool, *Oct.* 22, 1857.

The adjourned inquest on the body of Frederick Fendle, aged four weeks, the son of a labourer, residing in Great Richmond Street, was resumed. At the previous inquiry, on Monday, Mr. A. Whittle, Surgeon, stated that on Friday afternoon the deceased was brought to his house in a comatose state, and evidently labouring under the effects of a narcotic. The child was of premature birth, and fed by hand; it was of an extremely weak and delicate constitution, and it died. On a *post-mortem* examination being made, he found that congestion of the brain was the cause of death, and he believed this had been caused by the medicine which had been administered.

Yesterday, the Druggist who prescribed the medicine, Mr. Edwin Taylor, was called as a witness. Being sworn, and cautioned that he was not bound to state anything that would criminate himself, he proceeded to say that he was a Chemist, and that he kept a shop in Richmond Row. Last Friday the mother of the deceased brought him to his shop, and asked him to give her something to ease the griping pain in his bowels. He gave her one ounce of a mixture which he kept ready made up for such ailments. She brought a bottle with her, and he put a label on it, with a direction that half a teaspoonful should be given for a dose. The mixture was composed as follows :—Calcined magnesia, ½ oz. ; powdered rhubarb, 1 drachm ; paregoric elixir, 2 oz.; spirit of nitre, 1 oz.; treacle, 4 oz.; spirit of sal volatile, 1 oz.; water, 1 pint. Witness said about 1-80th or 1-100th part of a grain of opium would be contained in half a teaspoonful of the mixture. The paregoric, so far as he knew, was prepared according to the London Pharmacopœia.

The mother of the deceased being called, said she guessed a half teaspoonful as well as she could.

In answer to the jury, Mr. Taylor said he kept the mixture in a bottle chiefly for his own family, and not to sell. He did not make a practice of retailing it out generally.

Dr. J. B. Edwards was then called.—He said he was an Analytical Chemist, and Lecturer on Chemistry and Medical Jurisprudence at the Royal Infirmary School of Medicine. He received on Monday last, from Mr. Blake, the beadle of that court, a bottle which he produced. The contents measured five fluid drachms, and he detected therein the presence of morphia and of meconic acid, two of the consituents of opium, but in very small quantities. Iodic acid and starch indicate the presence of morphia, but nitric acid afforded no reaction. Meconic acid was recognized by a persalt of iron, but the quantity was insufficient to produce a precipitate with acetate of lead, a slight cloud only was produced. Several solutions containing paregoric were prepared differing in strength, and a solution containing 1-10th of paregoric gave reactions closely resembling the mixture. This would indicate a quantity of paregoric about the same as in the formula now given. An ounce of the mixture would contain half a drachm of paregoric, the remaining five drachms contain about 1-9th of a grain of opium. Half a teaspoonful, the dose given, would contain 1-90th of a grain of opium. The smallest fatal dose on record was 1-12th of a grain of opium, which was given to a child two days old ; but the action of opium on young infants was extremely uncertain.

By the Coroner.—I consider that the practice of Chemists prescribing opium, in any quantity or shape, to young infants, is injurious, and highly to be condemned.

The Coroner, in summing up, pointed out that gross ignorance or rashness on the part of a Druggist, in compounding medicine which caused death, would constitute manslaughter ; that a lesser degree of culpability was designated "chance medley," which was not punishable by law ; and that the mother of the deceased might possibly have administered more than half a teaspoonful, as directed.

After a brief consultation, the foreman of the jury said :—"Our verdict is 'Chance medley' against both parties—the Druggist and the mother. We wish also to express our condemnation of the practice of Druggists prescribing at all upon such occasions."

The Coroner thought it highly improper for Druggists to prescribe medicines ;

their duty was simply to administer. The verdict was one shade removed from manslaughter. It was a pity the mother was involved in the matter, seeing that she thought she was acting for the best; but the Druggist ought to have known better than to administer opium to a child so young.

POISONING BY LAUDANUM.

At the High Court of Justiciary, Edinburgh, on Monday, November 9th, Elizabeth Hamilton pleaded guilty to culpable homicide, in so far as she administered about ten drops of laudanum to the infant son of Mr. Alexander Drysdale, *in order to induce sleep*, but which produced death. She was sentenced to eighteen months imprisonment.—*Times*, Nov. 12th.

DECEASE OF MR. AUGUSTUS STAFFORD, M.P.—INQUEST—ALLEGED OVERDOSE OF LAUDANUM.

The unfortunate decease of Mr. Stafford has excited a painful interest, not less among the public at large than in the profession: for, although the result of the investigation and the verdict of the jury exonerated the medical attendant, yet the amount of the dose administered and the severity of the subsequent treatment, entitle the case to notice, among other instances, of suspected poisoning.

Mr. Stafford had been for some time past afflicted occasionally with a painful disorder, the precise nature of which was in the first instance imperfectly recognized, but which eventually proved to arise from gall-stones. He also had a chronic organic disease of the heart, the symptoms of which were not very obvious, and during his last illness attracted but little notice, the urgency of the other disorder having appeared to be paramount. On the 4th of November, when at Cratloe, Mr. Stafford sent to Limerick, about five miles, for Dr. Griffin, on account of an attack of severe pain in his abdomen, which he had also suffered on some previous occasions. The doctor bled him and gave medicine containing laudanum, tincture of henbane, &c., and on his departure gave further instructions, and said the medicine would most likely promote sleep. About three in the morning the patient called up his servant, who was in an adjoining room, the bandage having come off his arm, which was bleeding. The cut having been bandaged, the servant sent for some milk, as the patient was exhausted, and on offering it to him found him so drowsy and confused in his conversation, that he sent for the doctor, who arrived between seven and eight. Finding the patient in a comatose state, the doctor ordered him to be removed from bed and walked about, which was tried, but soon abandoned.

Michael Naughten, the servant in attendance, stated at the inquest:—"When it was found impossible to keep him awake any longer by walking him, he was placed upon a chair and afterwards upon the bed, for the purpose of having the soles of his feet beaten to keep him awake. Dr. Griffin beat his feet with a razor strop for twenty minutes, until his hands got blistered, and he could not strike sufficiently heavily to keep deceased awake. Mr. Stafford would occasionally awaken, open his eyes, look around him, and then fall off to sleep again: witness followed the doctor and continued beating the feet until the razor strop broke. They had then to get the carpenter to make some small battledoors about eighteen inches long by four inches broad, and half an inch thick; the beating on the soles of the feet was continued until a dozen of these articles were broken. He was beaten on the feet until the skin blistered and came off: he used occasionally, when struck very hard, to rouse himself for a second, but always fell off again. He was struck on the palms of the hands and the calves of the legs, but ineffectually. At one time they had five men off and on engaged in the operation of beating. The beating was continued from about half-past eight in the morning until between eight and nine at night."

By this time the patient showed some signs of revival, and was replaced in bed. In the middle of the day, Dr. Griffin called in Dr. Wilkinson, of Limerick, who confirmed the general treatment. On the 10th instant deceased left Cratloe, and on

the following day came to Dublin, where he was attended by Sir Henry Marsh, who had been his medical adviser on previous occasions.

Sir Henry Marsh stated in his evidence that he had received a letter from Dr. Griffin, describing the particulars of the case, from which, as well as from the agonizing pain and other symptoms, he suspected the presence of gall-stones, but had no proof of it until the *post-mortem* examination. One symptom—namely, jaundice—was wanting, but this is the case sometimes. Laudanum is the usual remedy in case of gall-stones, in fact it is the sheet anchor. From the letter of Griffin I judge that Mr. Stafford was treated for excessive agonizing pain. Whatever might have been the cause, his own word was "unbearable." It is not long since my own life depended upon it. If the complaint had been gall-stones, Dr. Griffin's line of treatment would have been correct; of course, I say that generally. The effect of an emetic in the first instance is depressing, but it passes away. A mixture of laudanum, hyoscyamus or henbane, and ether, fifty drops of each, is a full dose; but it depends upon the amount of pain. I think the stomach being emptied by an emetic would increase the effect of the dose. Henbane is a narcotic as well as laudanum, but different in its mode of operation. Laudanum is the more powerful, but the variance of preparation of hyoscyamus is so great that I could not form an opinion upon the proportion. Ether is an anti-spasmodic rather than a narcotic. A second dose similar to the first in all respects, and a third dose resembling the other two with the exception of the ether, I should consider a very large quantity to be administered within two hours, unless the pain were excessive. Nothing else could justify it. I should consider that the pain should be such as to endanger life to justify the giving of such a quantity, but excessive pain, long continued, does endanger life.

Mr. Blake.—Assuming that a patient were suffering from the effects of gall-stone from three o'clock until half-past six, should you consider that to justify the exhibition of so much narcotic within that interval?

Witness.—I could not form an opinion, not having been present at the case; it would depend altogether on the intensity of the pain. I could scarcely conceive that any circumstances would justify the giving of a fourth dose similar in quantity within two hours. Circumstances might possibly justify the exhibition of 150 drops of laudanum, 150 of henbane, and 100 of ether; but the four doses, making together 200 drops of laudanum, 200 of henbane, and 100 of ether, given within four hours, I can scarcely conceive any circumstances to justify. There are some persons so strong and so vigorous that they will take a much larger dose; but to a person unaccustomed to laudanum I should consider the quantity excessive.

Mr. Blake.—A party having again emptied the stomach by vomiting, and having taken either the three or four doses, as it may be, should you consider it correct treatment to have him blooded copiously?

Witness.—There, again, I must say a great deal depends upon the intensity of the pain; unless that were excessive I should not consider it correct treatment. I should consider thirty ounces of blood under such circumstances a large bleeding. It is sometimes sought to produce fainting, in cases of extreme pain, to alleviate suffering, and render the other remedies—such as laudanum and henbane—more effective. In my judgment, bleeding would tend to increase the narcotic powers of these medicines on the constitution; but there are cases of very violent bleeding, where opium given in large quantities has not that effect, and where laudanum may be given in full dose without mischievous results. I cannot call to memory any case of hemorrhage in which the quantities of narcotic medicine that have been mentioned were given to subdue intense pain, but I have seen other cases of excessive pain, and of *delirium tremens*, in which the same amount was administered. The cases of hemorrhage I alluded to were cases of parturition, which I only know from hearsay, as it is not any part of my own treatment. I have exhibited laudanum in large quantities, but I cannot say to what precise extent.

Mr. Blake.—After a bleeding of 30 ounces, and after a patient had taken 150 drops of laudanum and 150 drops of henbane, should you consider that a further dose of 50 drops of laudanum and 50 drops of henbane might be safely administered within four hours?

Witness.—I will not say it was wrong practice, but if you ask my own opinion, I

would not do it myself. Nothing could justify it but the most intense pain. Of course it would be *à fortiori* if a person had previously got 200 drops of each.

Mr. Blake.—From the letter of Dr. Griffin, and your personal knowledge of the case, would you say that narcotic medicine contributed to the death of Mr. Stafford?

Witness.—My own impression is that he had recovered from the effects of the narcotic medicine when I saw him, and save so far as it debilitated him, it did not contribute to his death. Bleeding and narcotic medicines unquestionably did debilitate him. It is my opinion that that debility did contribute to his death, but if he had had a perfectly strong sound heart, he would have recovered it all. I would say extreme inanition or debility was the cause of his death. After frequent examinations I discovered that the action of the heart was extremely feeble, and also that of his pulse ; the origin of that debility I believe to have been from a soft, weak, fatty heart, and thinness of the blood. I judge from the effects of the *post-mortem* examination, but I entertained the opinion that his heart was weak and soft. The debility of his heart was instrumental in causing his death, and another cause I believe to have been that for about thirty-eight hours there was an almost total suppression of urine. Instruments ascertained that the bladder was empty, but he was relieved by diuretics. I think the state of his kidneys had a share in his death. The opium and bleeding would not produce the soft weak state of the heart, which existed previously, but opium and bleeding could not be borne so well by one whose heart was in that condition. The state of the heart could not be clearly ascertained during the time that the remedies were being administered. I have known opium to produce suppression, but I have not known it to produce the condition which I have ascertained this to be in upon testing, containing albumen. From the letter that I got from Dr. Griffin I would not say there was a mistake in the treatment. It appeared to me to be very strong, but I would not form an opinion of its necessity in a case in which I was not present. I continued to attend him until his death. I would consider the circumstances of his stertorous breathing during the night, and the necessity of flogging the soles of Mr. Stafford's feet to arouse him from lethargy during the whole of the next day, as decided evidences of his having been completely narcotized, and the use of opium to, I would say, a dangerous extent.

To a Juror.—The re-opening of the wound and the secondary bleeding, superadded to the other causes, had a powerful influence in the production of the extreme debility which I witnessed, and of increasing the ultimate danger. In my opinion that second bleeding was very instrumental in bringing about the fatal result.

Mr. George Porter, who performed the *post-mortem* examination, assisted by Prof. R. Smith, described the diseased state of the heart, kidneys, gall-bladder, &c., which evidence was confirmed by Prof. R. Smith and also by Sir H. Marsh, who was present during a portion of the examination.

Dr. Griffin briefly stated the circumstances of the case and the urgency of the symptoms, which had demanded energetic and decided treatment. He invited any further investigation that might be desired.

Some explanation ensued as to the motive for holding an inquest in this case, and Mr. Blake, who attended on behalf of the family of the deceased, and also the Rt. Hon. H. A. Herbert, M.P., stated, that some mystery existing in the case, it was considered by the nearest relatives that the investigation was necessary.

The jury unanimously agreed to the following verdict:—"We find that the said Stafford Augustus O'Brien Stafford died from natural causes, and that there is no blame to be attached to Dr. Griffin for the treatment which deceased received while at Limerick under his care."

Mr. Kemmis, the Crown Solicitor, said, he thought it only right on the part of the authorities to say that the present had been just such a case as called for investigation, and in which inquiry was most desirable, so much so that he had attended throughout the entire proceedings, and had watched them with great anxiety. He was happy to add that he had arrived, in his own mind, at the same conclusion as the jury; but he had not done so until he had heard the evidence throughout.

SANITARY PROCEEDINGS IN THE CITY.—KEEPING EXPLOSIVE MATERIALS IN CROWDED NEIGHBOURHOODS.

(*Times Report, Nov.* 24.)

Mansion-house.—Mr. William Whittington Morris, of 13, Size-lane, appeared before the Lord Mayor in answer to a summons at the instance of Mr. W. J. Mitchell, Inspector of Police, charging him with having unlawfully stored upon his premises 10,000 gallons of naphtha, to the great terror, alarm, and danger of the neighbourhood.

The City Solicitor, who appeared in support of the prosecution, said it had been for a long time doubted whether it was a criminal offence to keep explosive materials and chemical substances within crowded neighbourhoods. However, the City, some time since, thought it right to prosecute in a case exactly similar to the present, and they indicted a person named Lester for having upon his premises a quantity of naphtha. That indictment was tried before one of the judges at the Central Criminal Court, and the jury found a verdict against the defendant, subject to the opinion of the Court above as to whether it was an indictable offence. That question was argued at great length at Westminster before the judges, and, finally, a decision was pronounced, the whole body, with the exception of one, being of opinion that, for any person to keep in a warehouse in a crowded city a quantity of explosive materials, which, in the judgment of reflective persons, was calculated to produce danger and alarm, constituted an indictable offence. He was spared the necessity of adducing evidence in the present case, as he understood that the defendant, with great discretion, judgment, and good feeling, had intimated to the authorities that he had removed, or would immediately remove the whole of the naphtha from the premises, and take care that no combustible or explosive material should be again deposited there.

The defendant, in reply to the Lord Mayor, said he had already agreed to give up the cellar in which the naphtha was stored. He intended to send the naphtha to the Custom-house.

Dr. Letheby, the medical officer of health for the City, said that naphtha was a spirit which was distilled from wood, and was called wood spirit, or wood naphtha. It was very inflammable, and was used for many of the same purposes as spirits of wine. It would fire at a temperature of 140, whereas spirits of wine required a much higher temperature than that. A little carelessness in removing the carboys of naphtha, to say nothing of the danger of burning gas in the cellar, might lead to most serious consequences.

The summons was adjourned for a fortnight, upon the understanding that proceedings against the defendant would be discontinued if within that period he removed the naphtha from his premises.

AN EXTRAORDINARY NUISANCE.

Mr. Thomas Piper, Jun., builder, of 173, Bishopsgate Street, and Mr. John Young, architect, of 35, King Street, Cheapside, were charged, upon the information of Mr. W. J. Mitchell, inspector of police, "for that they on the 19th day of November instant, in Bloomfield Street, Moorfields, did unlawfully and indecently disinter and dig up the dead bodies of divers persons whose names are unknown, and did unlawfully, knowingly, and injuriously place and permit the said dead bodies and parts of dead bodies, then in a state of decomposition, to be and remain exposed to the open air, whereby divers unwholesome smells did arise therefrom, and the air was thereby greatly corrupted and infected, to the danger and common nuisance of all the liege subjects of our Lady the Queen there inhabiting and residing."

In the course of the evidence it transpired that a quantity of bones had been removed and sold to dealers in marine stores. Mr. Piper denied all knowledge of any such offence, until his arrival in the Court. The excavations were made for the purpose of erecting a school adjoining the Catholic chapel, in Moorfields; in the course of which, the human remains were discovered in the burial-ground, one

portion of which formed the site of the school. Every precaution had been taken with a view of preventing such exposure and desecration, and Mr. Piper maintained that the guilty parties must have climbed a high wall to effect their object. Dr. Letheby, the medical officer of health, had given the needful instructions for preventing any nuisance from the exposure of the remains.

During the proceedings the olfactory organs of every person present convinced him of the presence of some animal substance in a far advanced stage of decomposition, and it was intimated to Mr. Goodman (the chief clerk) that some of the human bones were in court. That gentleman immediately ordered them to be taken away, upon which two police-constables, after a good deal of lifting and dragging, removed from the court a sack which appeared to contain nearly three bushels of bones. The doors and windows of the court were immediately thrown open, and after the admission of a little fresh air the business was proceeded with.

After some further evidence and consultation, on Mr. Piper undertaking to make a full investigation into the facts of the case and to do all that might be required by the officer of health, the case was adjourned.

OBITUARY.

JOSEPH GIFFORD.

Mr. Joseph Gifford was born at Wellington, in Somersetshire, on the 15th of July, 1781. At the age of fifteen, his father placed him with a Chemist at Bridgewater. At the expiration of his apprenticeship he came to London, and managed the business of Mr. Kinnaird, of Holborn, for some years; after which he went into a wholesale house, to acquire a full knowledge of that branch of trade previously to commencing business on his own account.

About the year 1804 he purchased a business in the Strand, which he carried on for many years; during the latter part of which time he was assisted by Mr. Linder, his nephew, whom he took into partnership, and who has succeeded to the business.

At the meeting of Chemists and Druggists, held at the Crown and Anchor Tavern on the 15th of February, 1841, for the purpose of considering Mr. Hawes's Bill, Mr. Gifford was called to the chair, and was an active Member of the Committee appointed on that occasion to watch and oppose the progress of the Bill.

It will be recollected that these proceedings resulted in the establishment of the Pharmaceutical Society, of which the above Committee constituted the first Council. Mr. Gifford continued a Member of the Council without intermission until the present year, when, the state of his health having prevented his attending to any business, he did not become a candidate for re-election. In the year 1853 he filled the office of President.

During the last three years his health was gradually declining, and he was no longer able to take an active part in the affairs of the Society; but his upright and zealous, but unassuming, co-operation for many years in the proceedings of the trade, of which he was one of the oldest Members, having been duly appreciated, he was retained in office as long as he could be prevailed upon to allow his name to be on the Council.

During the last three years Mr. Gifford resided chiefly at Camberwell, where his decease took place on the 7th of September.

BOOKS RECEIVED.

The Literary and Scientific Register and Almanack, for 1858. By J. W. G. Gutch, M.R.C.S.L., &c. London: W. Kent and Co. (late Bogue), 86, Fleet Street. (Seventeenth year.)

The principal additions to this Annual Register are in the articles on Astronomy, Physiology, and Photography, which are much improved.

A Handbook of Chemical Manipulation. By C. Greville Williams, Lecturer on Chemistry in the Normal College, Swansea, &c., &c. London: John Van Voorst, Paternoster Row. 8vo, pp. 580. 1857.

TO CORRESPONDENTS.

Methylated Spirit.—*A Correspondent* (Edinburgh) has sent the following printed form, which had been received from the Inland Revenue Office, the words in italics being written.

"*Inland Revenue Office, London, 20th Sept.*, 1857.

"Sir,—In reply to your application, dated the 12th instant, I am directed to convey to you the Board's authority for receiving Methylated Spirit, *to be used in making Varnishes and Medical Tinctures and Extracts.*"

Notwithstanding this permission from the Board of Inland Revenue, the use of methylated spirit in tinctures is not sanctioned by the College of Physicians, and is therefore not justifiable. The question has been referred to the College, whose special instructions upon it will shortly be received, and will be binding on all respectable Chemists.

A Subscriber (Dublin).—The practice of adding a small quantity of camphor to spirit of wine for the purpose of colourably medicating it, and thus evading the law, is not justifiable.

An Apprentice (Canterbury).—We have not observed the change alluded to.

J. (Manchester).—See any elementary work on Chemistry.

An Apprentice (Stirling).—The Pharmaceutical Latin Grammar.

A. K. (Oldham).—Apply by letter to the Secretary, 17, Bloomsbury Square.

An Assistant (Plymouth).—Ivory may be whitened or bleached by rubbing it first with pounded pumice-stone and water, then placing it moist under a glass shade luted to the sole at the bottom, and exposing it to sunshine. The moist rubbing and exposure may be repeated several times (*Ure's Arts and Manufactures*).

F. D. (Ramsgate.)—Tomes' *Dental Physiology and Surgery:* published by J. W. Parker, West Strand.

Excelsior.—(1.) Miller's *Elements of Chemistry.*—(2.) There is no royal road to knowledge: such a work as that suggested would serve to encourage superficial learning.—(3.) A knowledge of the symbols and equivalent numbers, which every Chemist ought to possess, is all that is required, excepting for calculations in analysis, for which there are tables appended to all works on that subject.

The Sale of Poisons Bill.—We have received another letter from *M. A. B.*, the chief purport of which is the suggestion "that all poisons should be transferred from the Chemists to the Apothecaries," upon the ground that "it would be worse than folly to hold back that which may benefit the million because it may be opposed to the views and to the *immediate* interests of the few." *A Member* has written to point out the fallacies in the former letter of *M. A. B.* This is not necessary. In publishing the letter we contradicted the popular delusion, which we designated an unfounded calumny, and the subject is now officially before the Members of the Society.

Erratum.—In last number, page 255, *for* "Thomas John Cutting, First Certificate," *read* "James Cutting."

Instructions from Members and Associates, respecting the transmission of the Journal, to the Secretary, 17, Bloomsbury Square, before the 20th of the month.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XVII.—No. VII.—JANUARY 1st, 1858.

THE QUALIFICATIONS OF DISPENSERS OF MEDICINE.

The establishment of a recognized professional qualification, by voluntary means, is of necessity a gradual and rather slow process. Without the direct sanction of the Legislature, or some substantial advantage or emolument, contingent upon the possession of such qualification, the *inducement* to undergo the labour of acquiring it, is merely an honorary distinction, the value of which is problematical. While there are in all classes of the community a limited number of persons, in whom the natural ambition of raising themselves above their fellows is a sufficient stimulus to industry, the majority are content to spare themselves all needless trouble. Their desires are bounded by the line which the law prescribes, and if their quantum of capacity and education be such as to enable them legally to carry on business, they are satisfied. How many hundred times within a few years have we had to answer the following question!—In case a Pharmacy Bill should pass, how will it affect assistants and apprentices of the present time? Shall we be able to commence business without passing the examination? Upon the answer to this question depends, in a great many instances, the decision whether the inquirers will study their profession and qualify themselves, or whether they will "enjoy" the benefit of exemption; that is to say, the privilege of commencing business with the smallest possible quantity of professional education.

Public opinion, when tending in the right direction, has an effect similar to law; for when it is found that a preference is given to those who possess a certain rank or qualification, the desire for public patronage operates as an inducement to comply with the required conditions. This indirect influence, however, is very slow and uncertain in its progress; the preference upon which the advantage is founded is entirely optional, and however decided may be the preponderance in favour of the improved system, there will always be a remnant of admirers of the "old school," whose interest or caprice induces them to discountenance any kind of innovation, and thus to retard the consummation of the desired reform.

The official recognition of a professional qualification by the Government, or by a public Board having place or patronage at its disposal, is an encouragement which may reasonably be expected, after a sufficient period of probation has been allowed, to test the efficacy of a system of education on the voluntary principle.

The Certificate of Examination of the Pharmaceutical Society has for some years been received with favour in several hospitals and other institutions, and the announcement that such certificate will be required in future by the Army Medical Department in the case of appointments to the office of Dispenser, will tend still more to strengthen the hands of the Society, by affording an additional inducement to young men to study with a view of qualifying themselves. It had been previously intimated (at the time of the war in the Crimea) that a preference would be given to those candidates who could produce the certificate of the Pharmaceutical Society, but that in the event of the supply not being sufficient, other parties would be eligible. It is now understood that the condition is imperative.

In the course of the past month communication was made to the Council of the Society on the subject, by the Director-General of the Army Medical Department, who had occasion to appoint forty Dispensers for service in India,

with as little delay as possible. Twenty having been previously in the service in the Crimea, were at once appointed, as well as ten others who produced the certificates of the Pharmaceutical Society: and as several candidates applied who had not passed the Examination, a special meeting of the Board of Examiners was appointed to afford them an opportunity of coming forward. Only four candidates presented themselves on that occasion, but in the mean time other young men who possessed the required qualification, and who were in situations, applied for an immediate release from their engagements, and were appointed for the service in India. The full number required have now been obtained, as appears from the following advertisement:—

"*Army Medical Department*, 6, *Whitehall Yard*, *December*, 1857.

"Gentlemen desirous of entering the Medical Department of the Army, and whose age does not exceed twenty-seven years, may apply immediately to this department for the printed form required to be filled up by every candidate prior to his being subjected to the usual professional examination.

"The minimum pay of an assistant-surgeon is to be henceforward 10*s*. per diem.

"N.B.—Neither dispensers nor dressers are required.

"A. Smith, Director-General."

This sudden retirement of young men from their situations, caused a number of vacancies, and here again the same question was asked:—"Have you passed the examination?" One after another finds himself rejected, because his answer to this question is in the negative; or if one should on an occasion be made an exception, it is only on condition that he takes a subordinate position in the establishment, performing the work of an apprentice until he has obtained his certificate. It is now therefore generally understood that a due qualification is essential not only in public situations, but in all pharmaceutical establishments of respectable position.

The recent regulation of the Army Medical Department will be productive of a salutary effect, and in proportion as this rule is observed in establishments generally—private as well as public—the rising generation of Pharmaceutists will be driven to the necessity of raising their standard of qualification, and the supply will be regulated by the demand.

PROCEEDINGS OF THE COMMITTEE OF THE PHARMACEUTICAL SOCIETY ON THE SALE OF POISONS.

The mass of information and suggestions furnished by the Members in reply to the Questions issued by the authority of the Council is so voluminous, that it has been impossible to classify and arrange the evidence thus obtained in time to lay it before the meeting of the Members in January in a satisfactory form for discussion. The Committee has met several times on the subject, and some of the Members have individually assisted the Secretary in the investigation of the returns, with a view of extracting from the result the substance of some tangible and definite propositions for the consideration of the Members.

The number of copies of the circular issued were—to Members in the country, 1819; in London, 392: of which the following answers have been received—from the country, 921; from London Members, 206. Some of the answers from the country are sent by individual Members, others are the result of a conference in the town or place, and represent in one return the opinions and information furnished by, or on behalf of, the Members in the locality indicated. Up to the date of the last meeting of the Committee it had not been possible to complete the arrangement of the evidence already in hand, and as more answers continue to come in by each post, it was decided that it would be better to give the Members a very brief outline of the proceedings up to the present time, and to defer the discussion of the subject until the meeting in February.

The Questions are inserted, that the remarks on each may be intelligible.

[The following articles constitute the "Schedule of Poisons" in the proposed amended "Sale of Poisons Bill."

1. Do you sell by retail all or any of them ?—Arsenic, and its Compounds—Corrosive Sublimate, and its Solution—The Poisonous Vegetable Alkaloids, and their Salts—Prussic Acid—Cyanide of Potassium—Essential Oil of Bitter Almonds, or any mixture containing it—Cantharides—Aconite and its Preparations—Opium, crude or in tincture, extract, or powder—Chloroform—Oxalic Acid and Salts of Sorrel—Nux Vomica—Tartarized Antimony, and its Solution—Cocculus Indicus.

2. Is any one or more of the above poisons in great demand in your neighbourhood ; and if so, which ?

3. Can you give an idea of the nature and extent of such demand. That is to say, the purposes for which the said articles are required, the class of persons using them, whether in large or small quantities, frequently or otherwise ?]

The replies to Questions Nos. 1, 2, and 3, relating to the sale of the poisons in the schedule, and of other poisons, by Members in various districts, indicate considerable diversity in the local customs, depending on the nature of the demand for manufacturing or agricultural purposes, or on the habits of the public. Some poisons which are in general use in one place are rarely, if ever, applied for in others. Hence a schedule of poisons, however suitable in one district, might be inapplicable, or in fact, *impracticable* in another. This proposition will be more clearly intelligible when the answers to the first three questions are reduced to a tabular form, which is in progress.

[4. Are there any other Poisons in regular demand in your neighbourhood requiring as much precaution in their sale and use as those above enumerated? If so, please to name them·]

The answers to the 4th Question will be comprised in this part of the inquiry.

[5. Do you, in the ordinary exercise of your discretion, frequently refuse to sell poisons, and has it come to your knowledge that accidents or crimes have been prevented by such precautions ?

6. If any cases of accidental or criminal poisoning have occurred in your neighbourhood, can you state which poison or poisons have most frequently been the cause, and whether arising from carelessness or ignorance in the vendor or purchaser ?]

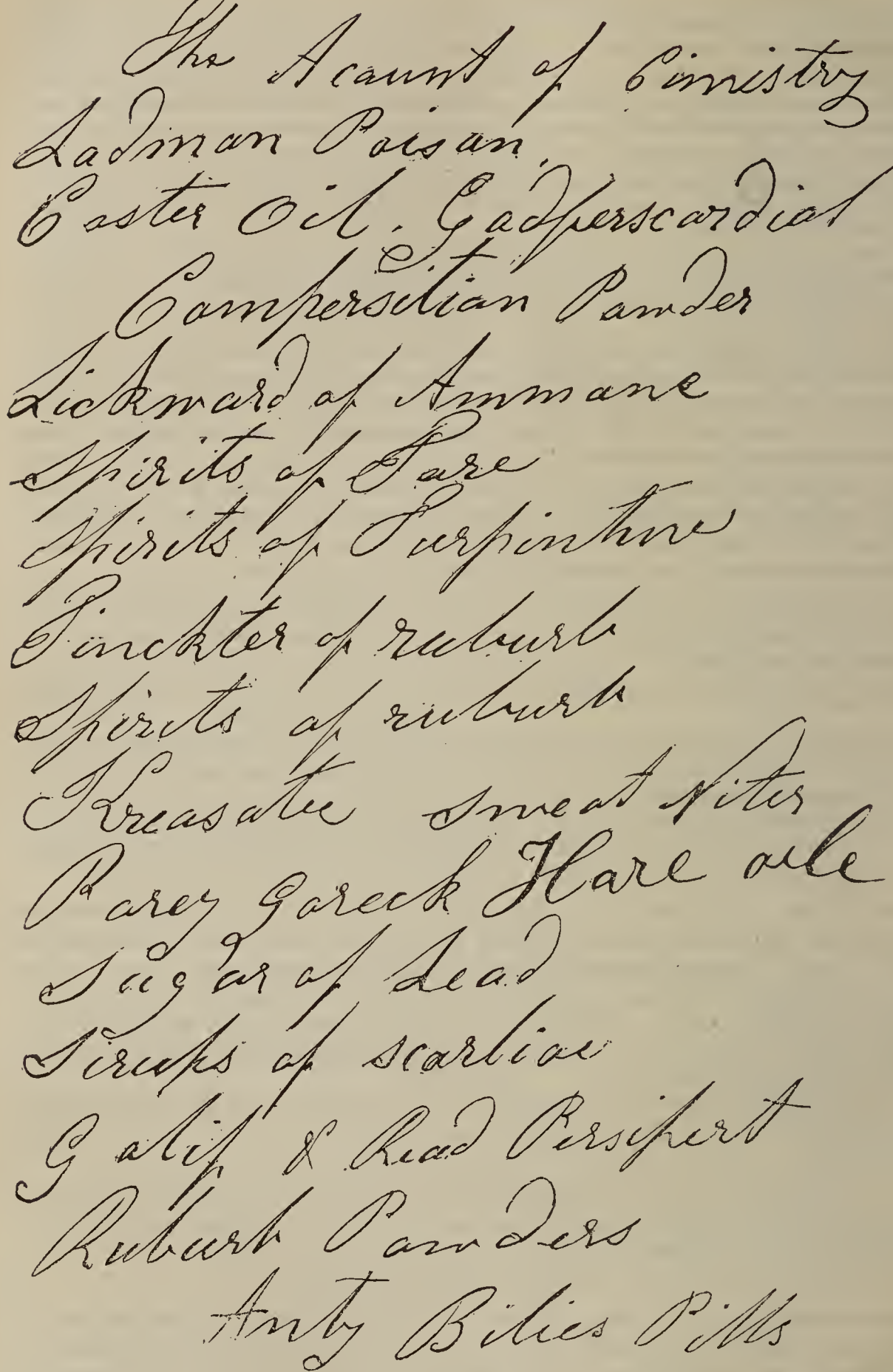
The answers to the 5th and 6th Questions contain some interesting practical information, the investigation of which is not yet completed. Reference is made to several hundred cases of poisoning, with such particulars as were known to the informants; also many instances in which crime has been prevented by the refusal to sell poison; others where the poison was refused by the Chemist, but afterwards obtained at a small shop in the neighbourhood, or some other mode of suicide adopted.

It appears from the tenor of some of the answers, that the 7th and 8th Questions, or at all events their object and purport, have not been uniformly understood :—

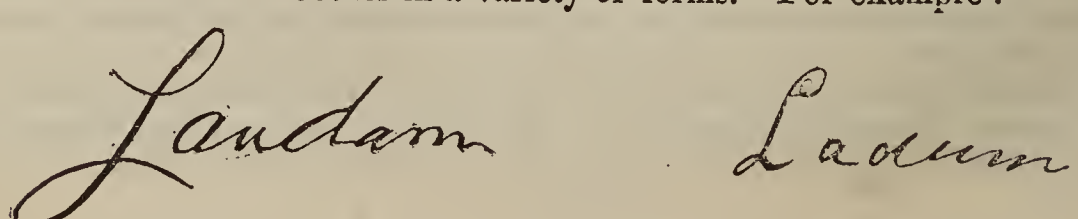
["7th. Are drugs, including poisons, sold to any extent by grocers, chandlers, and other persons, not Pharmaceutical Chemists, or regularly educated Chemists and Druggists, in your neighbourhood ?

"8th. What proportion do the former bear to the latter ?"]

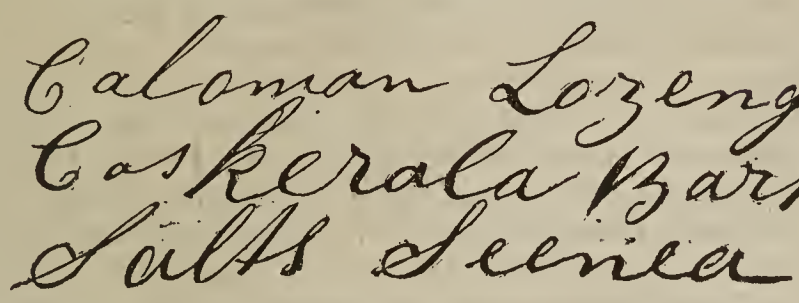
Some Members appreciating the value of correct statistical information on these questions, have taken the trouble to inquire respecting the custom which prevails in their neighbourhood among the several classes of shopkeepers referred to. In some instances, lists of the drugs sold, in the handwriting of the vendors, have been forwarded, and as these documents are curious and possess the merit of originality, we have selected a few specimens, which may be taken as a fair sample of the orthography. It would be impossible to do justice to them otherwise than in the form of a fac-simile. The names of course are omitted :—



The word laudanum occurs in a variety of forms. For example :—



And calomel is also distinguished in an original dialect:—



Some of our correspondents have visited or sent messengers to the small hucksters' shops in their neighbourhood, with a view of ascertaining what amount of facility exists for the purchase of poisons in that class of establishments. In one instance, a pennyworth of oxalic acid was asked for, and it was immediately supplied, screwed up in a piece of a waste bill, without label either printed or written. The customer then asked for an ounce of Epsom salts, which were taken from the drawer next to the oxalic acid, screwed up in a similar way, and not written on. As the customer was leaving the shop, the young man said "Perhaps I had better write on the acid;" on which he took up the parcel and wrote "Ox. acid," the Epsom salts being distinguished by not being written on. From its appearance it would scarcely have been guessed as Epsom salts at first sight, being very brown and dirty. The samples were sent to the Committee. In another similar shop (an oil shop), pennyworths of red precipitate, white precipitate, sugar of lead, sulphur, oxalic acid, and Epsom salts were ready put up in packets, not written on or labelled, and when applied for they were sold by a boy without any question or precaution. Some of the statistics are interesting and useful, comprising the population of the town and neighbouring villages for miles round, with the number of chemists, grocers, hucksters, &c., in each respectively. In many of the returns it is stated that there are in the locality a considerable number of small grocers' and hucksters' shops where poisons are sold "in the most careless manner." These shops are in numerous instances managed by women, who can scarcely read or write. "Many of the shop bottles are without labels, and in no case is an article labelled or written on when sent out." The reports as to the mode in which the sale of poisons is conducted in shops of this description would scarcely be credited, if the testimony were not authenticated by sources beyond the suspicion of a doubt. In some localities we are told that arsenic is sold in the small shops without any hesitation to any persons who apply for it, and that the Arsenic Act is not observed—its existence scarcely known.

While several correspondents have answered the 7th and 8th Questions with great precision, and obviously after strict inquiry as to the facts in their neighbourhood, others have replied in more vague terms, apparently trusting to the general impression, and giving the relative proportion of Chemists and other dealers in drugs in round numbers, without going into any particulars. In some instances, not only the number but the names of the individuals in each branch of trade are given; but it is also stated, that while it is believed that most of the small shopkeepers sell a few simple drugs, it is not known that they sell poisons to any extent. To these cases the Question (No. 7) is not intended to apply, as the information desired is the relative proportion of Chemists, and of incompetent persons having no pretensions to chemical education, who deal in drugs, *including poisons*. This is one of the most important Questions on the list, and before the Council can draw any inference from the information received on the subject, it is essential that the purport of the Question should be clearly and uniformly understood by all those who furnish Answers. In consequence of the wide discrepancy between some of the Answers received, it was considered that the Question had by some Members been understood in a different sense from that intended, and the Secretary was therefore instructed to

communicate with some correspondents to ascertain the fact. In reply, it has been stated in several instances (where the return had shown a great preponderance of chandlers and other general dealers over the regular Chemists) that this was intended to denote the entire number of persons carrying on the several trades enumerated, no inquiry having been made as to the number who actually deal in poisons. In some small villages where there are only two or three regular Chemists, and the return comprises the chandlers' shops in a rural district of several miles round, the return of twenty or thirty to one may be accounted for; but in a populous town well supplied with Chemists, such a preponderance of the other classes of shopkeepers *dealing in poisons* is scarcely probable: and in several towns or suburban districts in which the information has been obtained with strict regard to statistical accuracy, no such preponderance is found to exist. In several places the balance is on the other side, the sale of poisons by hucksters, &c., being stated to be rather the exception than the rule. It has been necessary to enter into a minute explanation respecting this part of the inquiry, for the purpose of obtaining more precise and circumstantial details; and the postponement of the discussion until next month will allow the opportunity of revising and correcting those returns which may have been furnished rather hastily or without a correct appreciation of the real purport of the Questions. If the requisite inquiry should entail a little trouble and occupy a few hours of time, such sacrifice will not be unwillingly made by those who duly consider the importance of the object and the bearing of this part of the question on the interest of all dealers in drugs, as well as the public at large. It is desirable, not only to ascertain with some degree of precision the nature and extent of the traffic in poisons by uneducated shopkeepers, but also to form some approximative estimate of the number of persons who would be likely to apply for a licence to sell poisons under such a law as the Bill now in contemplation.

With regard to the 9th and 10th Questions, it would be premature to give any report at present, further than to state that the provisions of the proposed Sale of Poisons Bill appear to have been maturely considered by many of our Members, and that some valuable and practical suggestions have been received, which will claim the serious attention of the Council.

THE TARAXACUM AND MORPHIA CONTROVERSY.

The misunderstanding on this subject is now sufficiently explained in Dr. Letheby's letter, which is subjoined. Dr. Letheby is right in supposing that up to the date of the remarks in our last number, our information on the subject was derived from Mr. Davey's two letters in the *Medical Times and Gazette*. The first of these letters we had published on account of the statement it contained respecting a "new chemical fact," which required either verification or contradiction. The second we were obliged to publish, as it modified, and, in fact, neutralized the previous statement. There was still a point to be cleared up, namely, the origin of the misunderstanding; for an explanation of which we kept an eye on the weekly medical journals, expecting to find the desired elucidation from the pen of Dr. Letheby. At length, two letters from the Doctor appeared in the *Lancet* of Nov. 14 and Nov. 21, but in neither of these did we find any allusion to the Taraxacum and Morphia question, the scene being shifted from the stomach of Mrs. A. G. to the body of Cook. It was obvious that the misunderstanding respecting the morphia and taraxacum must have originated in some verbal inaccuracy in the report, and it was of very little consequence, in a scientific point of view, whether the reporter at the inquest, or Mr. Davey, the author of the two letters, had misinterpreted the evidence. The fact having been established that the alleged fallacy does not exist, we dismissed the subject, concluding that Dr. Letheby did not consider it worthy of further notice.

But while we were content to leave the alleged error in diagnosis as a mere statement neither proved nor contradicted, and had no desire to dwell on that question (which is now revived in Dr. Letheby's letter), we could not allow the occasion to pass without a few remarks on the pugnacity of scientific men when arrayed against each other as witnesses in trials involving chemical or medico-legal questions. It is a notorious fact that when a case of importance of this nature occurs—a case of poisoning, for example—as soon as the professional witnesses have made a report, other witnesses are employed on the other side to refute their testimony. The stomach, or other source of the evidence, not being accessible to the adverse witnesses, a series of comparative experiments, founded on the description of the symptoms and the chemical report, must be contrived to elucidate—that is to say, to mystify—the case. Each witness provides himself with a supply of dogs, cats, rabbits, guinea-pigs, mice, frogs, &c.; the "massacre of the innocents" commences in the most aggravated form, exact notes being made as to the quantity of poison given, the number of hours of torture, and the intensity of the agony as indicated by the liveliness of the death-struggles of the victims.

Then comes "the tug of war" among the operators, each vieing with his rivals in the smallness of the dose administered, the amount of effect produced, and the accuracy of detection in the stomach after death. It may be an interesting question in toxicology how small a dose of strychnia will kill a dog, leaving a dose for a guinea-pig in the dog's stomach, and enough in the stomach of the guinea-pig to tetanize a frog; and some credit is due to the inventors of these delicate experiments. But we regret to see the bitterness of the alkaloid infused in discussions between professional men on such subjects, and to this view of the question the remarks in our last number were directed.

TARAXACUM NOT A SOURCE OF FALLACY IN TESTING FOR MORPHIA.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—At page 298 of the last number of your Journal you have alluded to a controversy—if controversy it can be called, seeing that the disputants are of the same mind—as to the possibility of confounding taraxacum with morphia or opium; and the severe tone which pervades your comments is evidently due to an imperfect acquaintance with the facts of the case; indeed, it is quite clear that your knowledge of the matter has been derived from two letters published in the *Medical Times*, and copied into your Journal at pages 243 and 293.

In the first of those letters it is asserted, that in my hands taraxacum furnished reactions which were mistaken for those of morphia; and the second goes on to say, that if I had used proper skill and caution such a mistake or fallacy could not have occurred. I was not in England when those letters were published, or I should have answered them at once; in truth, I did not know of their existence until the beginning of last month, when my attention was directed to an article in the *Guy's Hospital Reports*, where they are made the basis of an attack upon me, not merely for incompetence in confounding the two drugs in question, but also for rashness in relying on colour-tests as a means of discovering strychnia. I felt that the two questions were so entirely distinct that they ought not to be discussed in the same article, or even in the same journal. I therefore chose the *Lancet* for my reply to one, and the *Medical Times and Gazette* for my reply to the other. Your Journal must have been in type, and was probably in print, before the last of those answers was published, and therefore you were not acquainted with the real facts of the so-called taraxacum fallacy. This, I have no doubt, is the cause of the errors into which you have fallen in supposing that I had confounded taraxacum with morphia, and that I had also confused the subject still more by mixing it up with the strychnia controversy.

In answer, therefore, to your remarks at page 298, I will merely say that I did not "report the presence of morphia, equivalent to one grain of opium in a certain portion of the contents of a stomach;" that I had no "occasion to reverse my decision;" and that I did not "announce the discovery that taraxacum produces similar reactions, and is therefore a source of fallacy in testing for morphia." The true facts are these: On the 29th of July last, I was requested by the Coroner for Essex to examine the stomach, &c., of a woman who had died a few days before under somewhat peculiar circumstances. The stomach contained about half a table-spoonful of fluid matter, like gruel in consistence, but of a red colour. This matter gave what appeared to be distinct traces of morphia, for it furnished a resinoid substance that was strongly reddened by nitric acid, and that acquired a bluish-green colour with a persalt of iron. When I was asked by the Coroner how much this resinoid substance might be, I answered to the best of my belief, and said that perhaps it might be about the tenth of a grain; and I further said, *in reply to another question*, that a tenth of a grain of morphia represented not more than a grain of opium; but all who are acquainted with the way in which questions are put to a witness at coroners' inquests will know how the value of these replies is affected by the omission of the questions, and will also perceive that they do not admit of the construction that I had actually obtained a grain of opium, or even a tenth of a grain of morphia. But further, when I heard from the Coroner that the woman had been taking medicine a short time before her death, I begged to withhold my *decision* until I had examined the medicine. The inquest was therefore adjourned, and in the course of the day I received *two* bottles of medicine, each having the same directions on a label, from the same Druggist. One of these bottles was of an oval form, and it contained a pale-coloured acid mixture, that had not been opened. Its specific gravity was 1007; it required 2.4 grains of carbonate of soda to neutralize 1000 grains of it; and it furnished ether, camphor, a little spirit, and a quantity (24.4 grains per 1000) of a brown vegetable extract. This extract was not in any way confounded with morphia or opium, for it contained nothing like either of them.

The other bottle was of a six-sided form. Its contents were of a dark red colour, and two doses had been taken from it. The odour was ethereal, but the mixture was not acid. Its density was 1026; and on analysis 1000 grains of it yielded 120 of alcohol (sp. gr. 794), 92.2 of crystallized sulphate of magnesia, a little ether, camphor, and 23.9 of a dark brown vegetable extract, which appeared to be chiefly composed of senna. It also contained a resinoid matter, which was reddened by nitric acid, and which gave a greenish colour with a persalt of iron. This was evidently the same thing which I had met with in the stomach, and so I stated in my letter to the Coroner. What that thing is I know not, although I wrote to the Druggist, whose label was on the bottle, telling him that I had examined a mixture, *not the taraxacum mixture* supplied to the deceased, but one which contained Epsom salts, tincture of senna, ether, camphor mixture, and something else, the nature of which I wanted to know. The Druggist came to me, and recognized the mixture as his usual fever compound, but what else he had put into it he knew not. My first letter to the *Medical Times* was in the hand of the Editor when the Druggist visited me, and therefore it cannot be said that I learnt the composition of the mixture from him; but be the thing in question what it may, it is clear that I have not confounded taraxacum with morphia, and that the charge against me of having done so has arisen from an imperfect knowledge of all the facts of the case. If the correspondent of the *Medical Times* had written to me at first on the subject, as I think he ought to have done, seeing that he had no interest in the matter beyond being an idle looker-on at the inquest, I should have informed him of his error in supposing that I had had only *one* bottle of medicine for examination, and that the taraxacum mixture. As it is however, he has caused a controversy which I should be very happy to settle, if I could, by ascertaining from him or the Chemist what the senna mixture really

contained in addition to what I have mentioned, for, by arriving at that, a fact of some importance may be added to toxicological science. I ought, however, to say, that the resinoid matter is to be distinguished from morphia by its solubility in ether, and its amorphous or uncrystallizable form.

I remain, Sir, &c.,

College Laboratory, London Hospital. Hy. Letheby, B.M.

MEDICAL ADVERTISING AND UNDERSELLING.

The integrity of the entire Profession is concerned in maintaining each of its branches in a healthy creditable state. As the vine disease, when breaking out in one part of the vine, is likely to spread unless subjected to excision or other appropriate treatment, so vicious habits and empirical propensities in the several departments of the Medical Profession are contagious and require to be kept in check for the general good. Pharmacy being a part of the Profession (corresponding to the stomach in the body which furnishes the supplies for general circulation), we sometimes in this capacity notice irregularities and frailties in whatever department we may chance to observe them, and our neighbours, on the same principle, return the compliment. We frequently have occasion to give our own Members friendly advice against the tendency to low disreputable puffing, but our arguments and professional zeal occasionally come into unfavourable collision with the example of Physicians and Surgeons, who, as they are supposed to belong to a higher grade, are naturally expected to indicate a corresponding elevation in their mode of transacting business.

A correspondent has sent us an advertisement, cut out of a local newspaper, describing a kind of practice which prevails in an important town in the north of England. We omit the names, but insert an extract from the letter, which describes the *modus operandi* of the practitioners:—

"*Thursday*, 10*th Dec.*, 1857.

"'Dr. ———, for the last Six Years Resident Medical Officer to the ——— Dispensary and Fever Hospital, Gives Advice, Visits if necessary, and prepares his Prescriptions with the best London Medicines, for Cash only, on a Scale of Charges from One to Two Shillings for each Consultation, by which plan he is enabled to charge much lower than on the long credit system. Hours at Home—9 to 11 Morning, and 5 to 8 Evening.'

"This day's *Express*, a local paper, contained the enclosed advertisement, issued by one of our M.D.'s, and late resident officer of the ——— Dispensary. We have two M.D.'s and three M.R.C.S.'s developing this principle in ———; two of them bill and placard all the neighbouring towns and villages. The late Senior Surgeon of the Infirmary quacks in the same style, having from 150 to 200 patients daily. One of this class solicited me to make up his prescriptions at a price that would startle a respectable tradesman; and when I urged that it could never pay, he replied, 'Yes, it will pay well; Epsom salts, saltpetre, and a little burnt sugar are good enough for paupers.' The medicines of the more respectable are pil. hyd., magnes. sulph., potass nit., creta ppt., conf. opii, and the preparations of arsenic; no quinine, no tinctures, nor costly drugs."

Even in the metropolis, the Profession is not free from occasional blemish. Outside the Cattle Show, in Baker Street, a man was seen last week, in the dusk of the evening, distributing papers about the size and texture of a bank note, containing a description of Dr. W—— B——'s specifics. The nervo-arterial specific for spermatorrhœa, nervo-uretheal specific for gonorrhœa, arterial and antivenereal specific for syphilis, and recommended in the usual style of puffing, with the customary allusion to the "stern obligation of inviolable secrecy." The reason for noticing the circumstance is, that the advertiser styles himself "Member of the Royal College of Surgeons, London, 1835, and Member and Licentiate of the Apothecaries' Company, 1834." Have these learned bodies no power to control or eject such members?

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

DISPENSERS OF MEDICINE FOR SERVICE IN INDIA.

We understand the Director-General of the Army Medical Department has refused to engage any candidate for the office of Dispenser of Medicines for service in India who cannot produce the certificate of the Pharmaceutical Society; and it is understood that he will require that document in all future cases, so as to have proof that applicants have been properly tested and found efficient compounders of medicines.

AT A MEETING OF COUNCIL, *December, 2nd*, 1857,

Present—Messrs. Bell, Bird, Brew, Bucklee, Deane, J. B. Edwards, Hanbury, Meggeson, Morson, Peacock, Sandford, Smith, Squire, and Waugh, the following was elected a

MEMBER.

Lower Clapton.....Goodwin, John

SPECIAL BOARD OF EXAMINERS, December 4.

MINOR.

Bearcroft, Richard James.....Cheltenham
Fowler, Charles Henry.....London
Hawkes, James.....Birmingham

MAJOR EXAMINATION, *December 15th.*

Avice, Ernest.....Mauritius
Crispin, William.....Sand Hutton
Dulley, Joseph.....Northampton
Jones, Peter Cooke.....London
Jones, Thomas.....Chester

MINOR EXAMINATION.

Clark, John.....Grantham
Goldfinch, George.....London
Hunneman, Charles Julius.....Hanover
Icke, Henry Scott.....London
Richards, Thomas Lewis.....Chester
Thompson, John Robert.....Thirsk
Wigg, Henry John.....Lynn
Woolley, George Stephen.....Manchester

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	ADDRESS.
Evans, Alfred Paget	Mr. Cutting	Leamington
Lacey, Walter	Mr. Meredith	Bristol
Pritchard, George Frederick	Mr. Barnes	Knightsbridge
Stone, George	Mr. Tonge	York
Symes, Charles	Mr. Ellis	Thornbury

PHARMACEUTICAL MEETING,

Wednesday, Dec. 2nd, 1857.

MR. JACOB BELL, PRESIDENT, IN THE CHAIR.

The following Donations to the Library were announced:—

Catalogue of the Library of the Royal Institution.
Notices of Meetings of the Royal Institution, from the Royal Institution.
Bulletin de la Société Botanique de France, from Botanic Society of France.
Journal of the Society of Arts, from the Society of Arts.

The Chairman said there were two subjects to which he must refer before entering on that which had been specially announced for the evening. The first was in reference to the Prize offered by the Council for the best Essay on Starch Granules. One Candidate only had competed for the prize; and the Committee had come to the following resolution in reference to it:—

"That the Committee having carefully read and considered the Essay both individually and collectively, are unanimously of opinion that the merits of the work are not such as to entitle the author to the Pereira Medal."

The other subject was Methylated Spirits, which occupied the attention of the last meeting; and, in accordance with the decision then come to, he had communicated with the President of the Royal College of Physicians, stating broadly the facts of the case on the part of the Pharmaceutical Society, and requesting to have the instructions of the College in reference to it. He received a few days since a communication from the College, accompanied with a letter from Dr. Francis Hawkins, the Registrar, stating that a communication had been made to the Board of Inland Revenue. The former, which would be published in the *Gazette* and the medical journals, was as follows:—

"Royal College of Physicians,
"*Nov. 25th*, 1857.

"The Censors of the Royal College of Physicians, having learned that in the manufacture of tinctures and some other preparations of the Pharmacopœia it has latterly become the practice of certain Druggists and Manufacturers to use methylated in the place of pure spirit, hereby declare their disapproval of such an unauthorized departure from the instructions laid down in the Pharmacopœia."

The following is a copy of Minute of the Censors' Board, transmitted to the Board of Inland Revenue:—

"Royal College of Physicians,
"*Nov. 25th*, 1857.

"The President and Censors of the Royal College of Physicians, having had their attention called to an unauthorized departure from the instructions of the Pharmacopœia in the manufacture of tinctures and other preparations, by the use of methylated instead of pure spirit, have found it necessary publicly to express their disapproval of such departure, and beg to call the attention of the Board of Inland Revenue to the fact, that an assumed authority for this deviation from the rules of the Pharmacopœia is said to have been derived from an order or minute of the Board of Inland Revenue, giving a general permission to use methylated spirit in the preparation of medicinal tinctures and extracts."

The decision of the College would settle the question,—viz., whether it was proper or not to use methylated spirits in tinctures and preparations of that description. They had now the distinct prohibition from the Royal College of

Physicians against their use. He then proceeded to the business of the evening, that of considering the proposed LEGISLATION IN REFERENCE TO THE SALE OF POISONS. The Bill emanating from the House of Lords was before the public in its amended form. The promoters of the Bill were strongly in favour of passing a measure for the protection of the public against accidental and criminal poisoning, and the Pharmaceutical Society from its establishment had advocated some improved Legislation on the subject, and had continually pointed out, at its meetings and in its various publications, the anomalous fact, that whilst in every other country in Europe the legislature interfered to protect the public from the sale of poisons by persons ignorant of their nature and totally unfit to be trusted with them, there was in this country an absolute free trade in them, any person being at liberty to open a shop and sell drugs, however poisonous or deleterious, without any regulation whatever, except in the case of arsenic. On the introduction of that measure into Parliament, its provisions passed through the ordeal of a scrutiny by the Members of the Society, and it was by the answers given to inquiries of the Members, and valuable statistical information so obtained, that they succeeded in materially modifying its provisions, and making it a less objectionable and more efficient measure than as originally drawn up. With regard to the present state of the question, the Society had always been in favour of judicious legislation, and had never been disposed to obstruct the passing of such measures as the welfare of the public might require; but at the same time the Society (being a Society of practical men, acquainted with the nature of the business, and the circumstances under which the public required poisonous articles, and the precautions necessary in furnishing them) was capable of forming a judgment on the details of a measure of this kind. The Members had individually been consulted by means of a circular that had been forwarded to them, asking for certain information; and he felt that their opinion must have some influence. The first question they had to consider was with regard to the abstract principle of legislation—viz., if legislation was to take place, in what direction ought it to go? and then, was the Bill now before Parliament a step in the right direction? To be enabled to arrive at a right conclusion on that point, they must first consider the position of the public without a Bill, and then what it would be if the Bill passed. At present the public were at the mercy of the discretion of the vendors of poisons. The Pharmaceutical Chemist, who understood the nature of poisons, and the precautions requisite in their use, took care, for his own sake, to adopt caution as to the mode in which, and the persons to whom, he sold them. It had been said, and he thought the illustration a very correct one, that the Pharmaceutical Chemist carried on his business with something like a guillotine hanging over his head. He knew that he was liable at any moment to an accident occurring with the powerful materials with which he dealt, it might be without any fault on his part, and for which he was nevertheless held responsible. An accident occurring through his inattention or carelessness, might deprive him of half of his business, and he was therefore with regard to restriction under much heavier penalties now than he would be under any Bill, because a penalty of £10 was nothing in comparison with the anxiety and heavy pecuniary injury which an accident might now inflict on him. A Chemist fully sensible of his responsibility, would not be satisfied with merely entering the name of the purchaser in a book in the presence of a witness, as required by the Bill, he would require to be satisfied that the parties to whom he sold the poison knew its nature, and how to use it, and might safely be trusted with it. According to the provisions of the Bill, vendors of poisons would only have to obtain witnesses when sales were effected, and enter them in a book, to remove all responsibility from themselves, and throw it on the Legislature. The Pharmaceutical Chemists, without any such restrictions, would have much stronger motives in being cautious; and he saw no reason why they should not be exempt from them as

the medical practitioner. Medical practitioners were to be specially exempted from the provisions of the Bill; but the Pharmaceutical Chemist, who was practically qualified for his business, and was daily becoming more and more qualified and educated, was to be subjected to the oppressive restrictions that had been drawn up expressly for the ignorant vendor. The Bill he held in his hand was drawn up on the assumption that certain articles mentioned in the schedule were poisons, and to them alone the provisions of the Bill were made to apply. Now, supposing it were passed into a law in its present shape, the qualified Chemist would only have his reputation to consider, in reference to the sale of poisons not named in the schedule; and the unqualified person, being ignorant of the nature of those poisons, would have no means of ascertaining whether his customers understood that of which he himself was ignorant, and no instructions in an Act of Parliament could supply the place of practical knowledge in the vendor of dangerous substances or compounds. The Bill enacted that certain poisons should be kept in a different part of the shop from others, and the precautions prescribed had only reference to that limited list; whereas there would be found amongst the other part of the stock, a great variety of substances as dangerous as most of the drugs enumerated in the list of so-called "poisons." Assuming, therefore, that any persons not qualified were allowed to sell poisons, the Bill would rather tend to remove responsibility from the vendor, without giving a corresponding protection to the public. The authors of the Bill had at length, however, recognized the fact that some qualification was necessary in persons selling poisons; there were some clauses in the Bill providing for the examination of persons who hereafter should sell them; and every oilman, grocer, huckster, or of whatever capacity, who dealt in any of the substances mentioned in the schedule, must first obtain a licence for so doing. That was a step in the right direction, because it was obviously right that persons who dealt in dangerous substances, should understand their nature. Having briefly mentioned some general outlines of the restrictive nature of the Bill, he need not enter on the question of putting poisons into triangular bottles and labelling everything "Poison" that came under the schedule of poisons; which, carried out as laid down, would practically involve an absurdity. Antimonial wine, tartarized antimony, tincture of opium—and other medicines contained in the schedule—were used medicinally in small quantities; and, according to the wording of the Bill, every drug or medicine comprised in it, without reference to quantity, must be labelled "Poison," and, if a solid, wrapped in tinfoil or gutta-percha. Then again, if they considered the effect of the colouring matter in mixtures they sent out containing any of the above articles, they would see how absurd was the theory when it was reduced to practice. The Bill, unfortunately, had been drawn by noble lords who had never served in Chemists' shops, and did not know the nature of the business and the effect some of the restrictions would have on the trade in general, nor to what extent it would interfere with the wants and daily necessities of the people. That some restrictions were necessary they did not and never had attempted to deny, and all they wanted was, that whenever a Bill of this kind was introduced, which might probably be the case during the ensuing session of Parliament, that it should be one that should give as much protection to the public as was practicable without interfering injuriously with the legitimate business of a Pharmaceutical Chemist and Druggist. They must always remember that the principal object they had in view was the welfare of the public; and the introduction of provisions that could not be acted on, would render the Bill inoperative, making it only a shadow of protection, likely to deceive and delude, instead of giving that benefit it was intended to afford. In order to arrive at some information with regard to the statistical part of the subject as to the use of certain poisons in various localities, the Council had issued a series of questions amongst the Members of the Society. Already the Council had received upwards of 800 replies out of the 2000 issued. It was evident that

valuable practical information would be obtained by that means, and it was the intention of the Council, with the approbation of the meeting, to arrange that mass of information, and submit it in a condensed form to the Members at a future meeting. The Council would take the earliest opportunity of fully investigating all the evidence before them, and then, armed with the opinion of the Society, meet again, and, if possible, submit for the consideration of the Members something in the shape of a definite scheme for legislation on the subject in a manner which he hoped would be conducive to the public welfare, and not injurious to those persons who desire to conduct their business in an honourable and proper manner. It was, as every one was aware, a very difficult subject to legislate on, and all they could do in order to arrive at a satisfactory conclusion, was to submit the provisions of the Bill to the test of practical experience, and when they found any of the provisions injudicious or impracticable, to endeavour to have them altered and modified or expunged, till they had reduced the Bill to a form consistent with the objects intended.

Mr. Giles, of Clifton, said the President on that and other occasions had so fully entered into the subject, that very little, if anything new, remained to be said. He could not, however, refrain from stating, that he considered the Poison Bill afforded a parallelism to the history of the Adulteration of Food Bill—a question on which the Society incurred some little ill-favour, it being unjustly assumed by some persons that the Pharmaceutical Chemists were hostile to legislation on the subject, whereas they were desirous of promoting purity in food as well as medicines, as would be found to be the case by a reference to the Society's past transactions. The same misapprehension appeared to threaten them with regard to the Poison Bill—viz., that they wished to impede legislation on the subject, and maintain a monopoly of the sale of poisons against the interests of the public. He disclaimed being actuated by anything like a commercial motive in opposing the Bill, and he thought the idea altogether absurd. The sale of poisons resolved itself into three forms: first, that sold in connexion with the arts and sciences; secondly, that for medicinal purposes; and thirdly, that for criminal purposes—which latter was too small an affair for the profit derived from it to be of any value in considering the subject. The grounds on which they opposed the Bill were, that it could not be practically carried out, and would be the means of imposing great inconvenience both on themselves and the public, without any corresponding benefit to either. The object which the Bill aimed at, that of preventing accidents by intermixture of poison with other articles in the shop, was provided against as much as possible in every well-regulated Chemist's shop by a poison closet, and to compel them to keep articles named in the Bill, which were of every day use, in a similar place, and increase the number, would only lead to confusion, and the probability of accidents therefrom. They did not keep medicines in constant and daily use in the poison closet, yet by this Bill they must do so. He did not mention the poison closet as a perfect arrangement, but he thought it one of considerable importance and safety. Legislating on the prevention of the sale of poisons was a very difficult subject, and it was not to be wondered at that gentlemen of no experience of a retail Chemist's business should find it surrounded with so much difficulty, neither was it surprising that in seeking for a remedy they should have had recourse to the opinions and suggestions of men who he believed were analytical Chemists and the like, and not conversant with the traffic over the counter in these articles. The most practical information on the subject was to be obtained from the Members of the Society, and he was glad to find the Council had adopted a course, by the issue of their circular to attain that object, though it must necessarily entail great labour on them to reduce the opinions of the profession to anything like a tangible result. The adoption of triangular bottles and colours for poisons which had already been admirably treated in the Journal, would, he

thought, tend to increase rather than diminish the evils arising from accident, because, if the public were taught to rely on the caution of others, they would get into such a slovenly way of handling poisons, that more accidents would result. Unfortunately, the Government would be unable to keep triangular bottles and the like exclusively for the use of poisons, and their contents would be as likely to be mistaken and more accidents arise therefrom than was now the case, by confounding their contents. He moved the following resolution, which he had no doubt would receive the support of the meeting:—

"That this Meeting, while desirous of promoting such legislative measures as the welfare and safety of the public may require in reference to the sale of poisons, regrets to find that the Bill introduced in the House of Lords, even in its amended form, contains some objectionable provisions, and is not calculated to accomplish effectually the object intended."

Mr. Squire, in seconding the resolution, concurred in all that had been said by the previous speakers. The Legislature had great difficulty in forming a Bill from the evidence taken before the Committee of the House of Lords. Any one who took the trouble to read the examination of the different scientific men, would find the most conflicting opinions expressed by them, reminding him of what Lord Chief Justice Dallas said on the Inverness case, "it was a lamentable thing to see men who stood so high in science, contradicting each other on that question." In reading over the evidence, one was surprised to find persons so high in repute as were the witnesses, proving that they were not judges of what was required. He thought the information they were seeking from their Members would be found highly important and of great assistance to the Legislature in passing a Bill on the subject. Indeed, one gentleman who must possess an angular mind, while he insists on all things angular, even to large cases of arsenic, consents that quantities of oxalic acid too large for angular bottles, may be an exception.

Mr. Fox said that if the measure be carried out he should have to make at least 200 entries a week of oxalic acid, laudanum, and one or two other items; and had red and white precipitate been retained in the schedule, his entries would have amounted to at least 500 a week. He denied that it was possible to carry out such a scheme, and he hoped the Pharmaceutical Chemists would express a decided opinion on the subject. Suppose, for instance, a farrier required a little laudanum and nitre for a horse, he could not be supplied with it without a witness, and an entry of all the particulars in a book. He considered the Bill an insult to the Pharmaceutical Chemists as a body, and it was their duty to make a stand against its becoming the law of the land. He was not opposed to legislation on the subject. He had grown grey in the profession, and knew the anxieties and cares which the present system entailed on the retailer. What he proposed was, that the Government should legislate on the subject so as to place the sale of poisons in the hands only of recognized Chemists and Druggists, and instead of tying them down to send out poisons in certain forms after certain cautions to make them responsible that the articles went out properly labelled, and into the proper hands. He objected to the proposed restriction on the Chemists and Druggists, whilst the Medical Profession were to be exempt, and in it he thought he could trace the cloven foot. More cases of poisoning arose from the indiscriminate sale of laudanum by Apothecaries and Surgeons who had shops, than by Chemists and Druggists. It was an evil greatly on the increase, and in nine cases out of ten it could not be checked, because they merely labelled the article "poison," without the address. Whereas a regular Chemist and Druggist almost invariably put his name and address on the article he sold. He thought they ought all to be placed on an equality in the sale of drugs. Whoever sold drugs to the public ought to be made responsible for his acts, whether he was an Apothecary and

Surgeon, or a Chemist and Druggist. He called on the profession to come forward and oppose the Bill.

Mr. Alfred Smee, as the principal medical officer of one of the largest accidental death insurance companies in the kingdom, had had occasion to think over the means for preventing deaths by accidental poisoning, and he had no hesitation in saying it was his decided opinion that legislation as proposed on the subject was calculated to be an injury rather than a benefit to the country, because they could not have the articles named in the schedule placed in triangular bottles, coloured, or any other trick performed on them, without interfering with the pursuit of science and the arts, and yet not prevent death from poison by accident or design. He instanced the large number of gentlemen who devoted themselves to photography, in whose hands alone were an abundance of the most powerful poisons kept in a Chemist's shop, as well as those who followed electro-metallurgic pursuits, who used almost every metallic compound, and in quantities more than any Chemist kept for the wants of the public. In every branch of the arts they found an abundance of poisons in use. In the hangings of rooms, arsenite of copper was to be found to a largeextent; and any one who desired to destroy life, had only to tear some down, and he would have then means of accomplishing his object. In the list of prohibited articles enumerated in the schedule, were two that every man ought to keep in his house—viz., preparations of opium and tartarized antimony. When cholera was prevalent, he distinctly stated that no housekeeper should be without a stock of them. They were most valuable medicines in the premonitory symptoms of that disease, and delay in procuring them might lead to the death of the suffering party. Persons travelling at such a period were not justified in being without them, and he never allowed any one who consulted him at such periods to travel without being supplied with them, or medicine containing them, to administer immediately, if required. With such facts before them, how was the Legislature to say the public should not have those articles? At such periods of disease as he had named, our charitable dispensaries made up those medicines by pailfuls at a time, not pints or triangular bottlesful, and then delivered it to the patients as they required it from early in the morning to a late hour at night. In every instance where he had been consulted by manufacturers employing large numbers of men, and also by the authorities of the Bank of England, he had desired them when cholera was prevalent to have a stock of medicine ready at hand for immediate use, which, it was known, contained a certain quantity of opium, because a few hours' delay in procuring it would be of the utmost consequence. He also objected to poisons being placed in triangular or coloured bottles, because it informed the ignorant public what might be used to destroy life. There was one poison which the Bill did not enumerate, as active as any that existed, which Chemists did not usually sell, but which was to be purchased at every public-house and in almost every street in every city of England, and that was tobacco. He did not mean when smoking, but when used as an infusion. What might be smoked with impunity could not be infused and swallowed with impunity. He had made a large number of experiments on animals, and he found that two pipefuls of tobacco in hot water would in ten minutes make a solution more poisonous in proportion than many of the poisons sold by Chemists. The Bill in question, he thought, would injuriously interfere with the present personal responsibility of vendors of poisons, and he had come to the conclusion, after a careful consideration of the subject, that the present attempted legislation would be fraught with mischief. No good would result from it; but, on the contrary, great inconvenience would arise to the arts, where poisonous substances were used to a large extent, and in all probability check their study. To tell the people exactly what was poisonous and what was not, was calculated to promote criminal results, and give rise to that which it was the object of the Legislature to check.

Mr. Waugh thought the question would come to this, if it had not already done so, viz., were they to oppose all legislation, as Mr. Smee's opinion, if followed, would lead them; or to ask for some good and useful legislation on the subject? The Government honestly desired to do something, and it was to be expected that a measure brought forward by persons ignorant of the business was likely to meet opposition from its defective and in some instances oppressive character. The Pharmaceutical Chemists must do one of two things. They must either oppose all legislation on the subject, or they must be prepared to propose a better measure than the present one. They were on a former occasion asked by a noble lord when in committee if they had a better bill to propose, and they ought to be prepared in the event of a similar question being again put to them. He was much struck with the evident sincerity of Lord Granville in respect to this subject, though he was much deceived on the point. The Government were determined to pass a Bill, and it might be easy for the Society to tear it to pieces. They must, however, make up their minds as a Society, and instruct the Council to oppose all legislation and have free trade in poisons, leaving it to each man's responsibility as now, or seek good legislation by going forward and endeavouring to assist the Government by stating the opinions of the Pharmaceutical Chemists on the measure, and where it required improvement. He thought it was possible to frame a good Bill that should recognize the claims of the Pharmaceutical Chemists as well as the regularly educated Chemists and Druggists. With regard to the Pharmaceutical Chemists they might be said to express at present only a fractional portion of the Chemists and Druggists of the kingdom, but he hoped a respectable portion.

The Chairman said they had frequently had to find fault with the attempt of inexperienced persons to make laws to regulate their business. Those who were proposing legislation did not understand the subject, and, as a consequence, their Bill was unsuited to the object they had in view. The Pharmaceutical Chemists did understand the subject sufficiently to say that the Bill of last session would not answer the purpose for which it was intended. They had had occasion to express a similar opinion on other bills, but it now became their duty to state what they thought, from their experience, would protect the public without placing improper restrictions and inconvenience on the dealer in pharmaceutical preparations. That was the object of the present movement, and it was desirable they should obtain all the statistical information possible, whether in certain localities certain poisons were much used, the purposes for which they were required, and whether, taking all those facts into consideration, the Bill now introduced would injuriously interfere with the requirements of the public in those various localities. The Council wished to know what the aggregate experience of the Society, numbering between 2000 and 3000 Members, led them to believe would be the probable operation of such a Bill as that now before them. They all knew how much easier it was to find fault with a measure, and amend and correct a draft, than it was to originate one in the first instance. They had the Bill before them, and, in considering it, they would be able to bring their experience to bear on its provisions. In it the question of qualification was specially alluded to, and that reminded him of a circumstance he had omitted to mention in his former remarks, that whilst it admitted the necessity of qualification, the Pharmaceutical Society was mentioned only with reference to the privilege of appointing one examiner out of six in the proposed Board. After having zealously laboured for seventeen years to protect the public by improved education, and place pharmacy in its proper position—after having had authority given them under the Pharmacy Act to grant certificates and diplomas to persons practising pharmacy in its highest branches—they were to be allowed by the proposed Bill to send only one out of six to be appointed to examine hucksters, grocers, oilmen, and general dealers, who introduced amongst their wares any of the articles enume-

rated in the Bill. That and other details of the measure they would be able to discuss at a future meeting. He had no doubt that the result of their investigation would be such that the Council would be able to prepare the draft of a Bill that would be either unobjectionable, or much less so than that before them.

Mr. Squire, jun., concurred in the opinion that they should assist in legislating on the subject rather than oppose legislation altogether. In consequence of the many notorious cases of criminal poisoning that had taken place, Government were determined to prevent it if possible by legislation, and the question for the Society's consideration was, how that object could be attained, as well as the prevention of the number of deaths that annually took place. These were of four kinds—suicides, murders, accidental poisoning, and poisoning by mistake. No legislation could stop a man's killing himself if he wished to do so, as they had recently heard a man could be murdered without poison, his bones put in a carpet bag, and the perpetrator of the deed avoid detection. He considered the adoption of triangular bottles and colouring matter would not prevent accidental poisoning, nor would it be an additional protection when placed in the poison safe. He was of opinion that the best way to check the evils complained of was, not by keeping a man down with legislative restrictions, but to make the vendor of the article a properly qualified person, responsible for his acts. The Pharmaceutical Chemist did not want the monopoly of the sale of poisons for the sake of gain, for he found it a bore more than otherwise to sell them. To allow, comparatively speaking, ignorant persons to sell poisons, provided they complied with certain regulations framed by law, appeared to him to be as absurd as to allow any person to write prescriptions provided he wrote the poisonous ingredients in blue ink.

The resolution was carried unanimously.

Mr. Hanbury moved the second resolution, as follows:—

"That the Council be requested to examine and arrange the evidence contained in the answers to the questions recently circulated among the Members, and to submit the result to a future meeting of the Society."

Dr. Edwards seconded the resolution, urging that the Pharmaceutical Society had been the means of modifying two distinct principles laid down in the first Bill,—namely, with regard to registration of sale, and the qualification of the vendor. The latter would be of immense benefit to the people, as it would be the means of raising their status as a profession.

Mr. Lavers, of Blackheath, said there was a certain amount of fashion connected with suicides by poisoning. Formerly the article selected was oxalic acid, but now it was out of repute for poisoning, but it was used by servants to a large extent for cleaning brass. He considered it, therefore, exceedingly difficult so to class that and other articles, as to say when it should be sold as a poison and when as an article of commerce. He rejoiced at the passing of the Arsenic Act. It relieved him of great responsibility, and he derived much pleasure in being able to refuse to supply arsenic. It was really extraordinary, when they considered the large number of Chemists there were in the country, and the number of young men employed by them, that so few accidents occurred; and he thought it a fact that reflected great credit and honour on them as a profession, as evincing the great care taken by them in the dispensing and sale of drugs. He condemned the practice adopted by many medical men in the dispensing of medicines, who were not open to the same means of detection if an accident occurred as were Chemists and Druggists; and he instanced that in his district two errand lads had become surgeon's dispensers. What greater security had the public in being waited on by lads of that kind than in being served over the Chemist's counter?

The Chairman said the Council would have a laborious task to perform in

collecting the information they required from the circular they had forwarded to the profession, and in reducing it to a tangible form, but they would readily perform it, believing they would be able to bring forward some definite proposition advantageous to the public.

The resolution was carried unanimously.

The Chairman, in adjourning the meeting, stated that the subject would most likely be resumed next month, and due notice would be given in the Transactions of the Society, which would be in the hands of the Members on the 1st of January.

[The discussion is adjourned until the 3rd of February.—Ed.]

PHYTOLOGICAL CLUB.

November 11th, 1857.

ROBERT BENTLEY, F.L.S., &c., PRESIDENT, IN THE CHAIR.

The following communications were read, but were omitted in the last number of the Journal, as the wood-cuts could not be finished in time for publication:—

ON A MONSTROSITY OF SCABIOSA SUCCISA.

BY ROBERT BENTLEY, F.L.S., &c.

The specimen which I now exhibit was gathered by me in the neighbourhood of Hitchin, Herts, on the 17th of last September. It is a monstrosity of the Inflorescence of the Devil's-bit Scabious (*Scabiosa succisa*), belonging to the natural order *Dipsacaceæ*, in which most of the flowers, instead of maintaining their normal sessile position on the receptacle, have become elevated in small clusters upon stalks, arranged in an umbellate manner (fig. 1). Each division of the general umbel also exhibits a tendency to divide again in a similar umbellate manner (fig. 1, *a*). and thus to form a compound umbel. This tendency is not, however, by any means so strikingly exhibited in the present dried specimen, as in one which I unfortunately lost after gathering. What renders this specimen still more remarkable, is the fact, that the general involucre is not only well marked, but its component bracts are even larger than usual (fig. 1, *b*), and each stalked cluster of flowers has also its own involucel (fig. 1, *c*). The general characters of the flowers themselves presented no peculiarity worthy of notice.

The specimen must be regarded as one of some interest, for, as far as I can ascertain from inquiries amongst our leading British Botanists, no similar one has been hitherto seen. It is very necessary, therefore, that the occurrence of such a monstrosity should be recorded; and in order to render it more evident, a wood-cut has been appended to this notice.

The specimen must be also considered as interesting in another point of view, for the tendency thus exhibited by the flowers of a Dipsacaceous plant to develop in an umbellate manner, is an indication of an affinity between that order and the *Umbelliferæ*. It will be important to ascertain whether such a monstrosity will occur in future years, and thus become permanent, and I shall therefore look carefully for it next autumn.

I may here state that I have seen in former years somewhat similar monstrosities in *Knautia arvensis* and *Scabiosa Columbaria*, but this is the first time I have noticed any such monstrosity in *Scabiosa succisa*.

The following notice was also read, and the specimen exhibited of a

Fig. 1.

Fig. 2.

Fig. 1.—Monstrous development of the inflorescence of the *Scabiosa succisa*. *b*. General umbel, with its involucre. *a* and *c*. Umbellules, with their involucels.

Fig. 2.—Monstrous development of the flower of a Rose. *a*. Whorls of petals. *c*. Axis Prolonged beyond the flower, and bearing true leaves, &c., instead of carpels.

MONSTROSITY IN THE FLOWER OF THE ROSE.

BY ROBERT BENTLEY, F.L.S, &c.

The specimen was given to me by Mr. Gill, one of my botanical pupils at the London Hospital Medical College during the last summer session. It presents the most remarkable illustration of *retrograde metamorphosis* which I have yet seen, for, although (as is well known) monstrous flowers of the rose may be seen yearly in almost any collection of that plant if proper search be made, yet such monstrosities are generally but exhibitions of tendencies in the parts of such flowers to revert to the typical leaf. In this specimen, however, the calyx maintains its normal form and character (fig. 2); the corolla consists of several whorls of petals (fig. 2, *a*); within these are a number of stamens, in various stages of transformation into petals; and within these again are a few stamens in a perfect condition (fig. 2). So far, therefore, the flower presents nothing remarkable, but the peculiarity of it, is in its central portion. Here, instead of finding perfect carpels, or carpels in a state of transformation into petals or leaves, we find the axis prolonged beyond the flower, and bearing on its surface a number of leaves, which exactly resemble in their form, condition of margins, and other peculiarities, those situated on the stem below the flower (fig. 2, *c*). The axis has developed as freely above the flower as below it, and does not exhibit the least tendency to form carpels or other flowers, &c., but in every respect resembles the ordinary leafy branch of the same rose. Such a monstrosity is a most interesting one, and is a striking example of the doctrine—that all the parts of the flower are formed upon the same plan as ordinary leaves, of which, indeed, they are to be regarded as modifications.

17, *Bloomsbury Square, Dec.* 9, 1857.

ROBERT BENTLEY, F.L.S., &c., PRESIDENT, IN THE CHAIR.

Mr. Hanbury exhibited some specimens of the sweet potato (*Batatas edulis*). The following communication was then made:—

LAMBERT'S PATENT INSTRUMENT FOR EXTRACTING THE EYES FROM POTATOES, AND COMPOSITION FOR THEIR PRESERVATION AFTER EXTRACTION.

BY ROBERT BENTLEY, F.L.S., &c.

In exhibiting to the meeting the above apparatus and composition, Mr. Bentley said, that any means that could be devised for saving food, could not but be considered as of the very highest importance, and he thought it very desirable therefore, that when any satisfactory experiment could be adduced in support of any contrivance devised for that purpose, the more extensively it was made known the better, as in such a way only, could we hope to induce persons to try experiments on a sufficiently large scale, and thus to demonstrate its general applicability or otherwise. Mr. Bentley stated that he had had no means of testing the apparatus himself, but he would read to the meeting the following statement, which at his request, Mr. Sowerby, the Secretary of the Royal Botanic Society, Regent's Park, had kindly forwarded to him:—

"Early in the present year Mr. Flood, our foreman, received one of Lambert's Patent Instruments for extracting the eyes (sets) from potatoes, and a box of the composition (powdered charcoal, camphor, &c.) prepared for preserving the eyes after extraction. With this instrument he cut the eyes from the potatoes required for his family, and threw them day by day into the composition, and towards the latter part of April he had obtained twenty-five ounces. These he planted in the Society's grounds at Hampstead; the produce when they were taken up in October was ten bushels of full-sized potatoes. The crop was above an average one, and if anything, superior to some other potatoes which were grown in the adjoining ground in the ordinary way.

"About half the produce in each case became diseased in the same degree soon after they were dug."

Mr. Bentley said that the result of the above experiment must be considered as very satisfactory, as the produce in this case was so much food gained, as under ordinary circumstances the eyes thus removed, would have been thrown away. If

the above plan, therefore, should be found to succeed upon further trials, the result would be, that the whole of the potatoes now used for the purpose of planting, might be saved, and hence there would be a corresponding amount of valuable food saved. The result of the experiment, so far as the prevention of disease, Mr. Bentley regretted to say, had not been attended with any success, although he thought it very possible, that should future experiments prove the general applicability of the above contrivances, that some means would be devised which would at the same time preserve the eyes of the potato from decay, and also destroy, or at all events considerably diminish their tendency to disease.

After reading the above note, a discussion took place upon the best means of preserving specimens for the Herbarium, in which Messrs. Bentley, Hanbury, and Wood took part.

The PRESIDENT then announced that the next meeting, which would be the Fifth Anniversary of the Club, would take place on January 13th, 1858, at half-past eight P.M. He hoped that on such an occasion there would be a good attendance.

PHARMACEUTICAL SOCIETY.

NORTH BRITISH BRANCH.

IN reply to inquiries from England, the Council of the Society in Edinburgh beg to intimate that the competition by Essays, for the two Prizes announced at the last meeting, will be open to Associates and Registered Apprentices throughout England, as well as in Scotland. JOHN MACKAY, *Secretary.*

THE EXAMINATION IN SCOTLAND.

THE Board of Examiners will meet in Edinburgh on Thursday, 14th January, 1858, at twelve o'clock (instead of Tuesday, 12th), and any Candidates who propose to come forward for examination are requested to communicate with the Secretary before the 1st of January.

A SCIENTIFIC MEETING will be held at nine o'clock on the same evening.

JOHN MACKAY, *Sec.*

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

Royal Institution, Thursday, 3rd Dec., 1857.

MR. W. WRIGHT IN THE CHAIR.

Mr. E. BOWEN was elected a Member, and Mr. Henry Morris an Associate.

Donations to the Museum were announced from Messrs. T. Morson & Son, London, Mr. G. Thompson, and Messrs. Edwards & Wharrie.

Mr. MERCER exhibited a new lamp lately introduced for burning paraffine oil, and Mr. GILL exhibited an improved stereoscopic camera.

Mr. J. ABRAHAM addressed the meeting on the "operation of the proposed Poison Bill," with digest of the evidence given before the Lords' Committee. He went over the provisions of the Bill, discussing the effects to be anticipated from them, his opinion being that the Bill would not succeed in its object. He next reviewed at great length the evidence taken by the Lords' Committee. He was of opinion that even the most modified restrictions upon the sale of laudanum to the poor would be evaded, and would drive the trade into the hands of an inferior class of tradesmen. The poison closet, he thought, would generally be a dark and ill-arranged place, calculated to increase the danger of accident.

Discussion followed, and the further consideration of the subject was adjourned until the Bill is again introduced.

Thursday, 17*th December*, 1857.

THE PRESIDENT, MR. H. S. EVANS, IN THE CHAIR.

The CHAIRMAN opened the proceedings by reading the following resolution, which, he said, had been passed unanimously by the Council of the Association:—"The Council have received with great regret an intimation from the Honorary Secretary, Mr. Nathan Mercer, that his health and strength do not permit his retaining the office in addition to his other business engagements. The Council further desire to express their high sense of the value of Mr. Mercer's services, and request that he will continue in office until they are able to relieve him by the appointment of a successor." He (the Chairman) was afraid that they would find it difficult to find a successor who would perform the duties so satisfactorily as Mr. Mercer had done.

Mr. MERCER said he could assure the Members that he felt very great regret in being obliged, through ill-health, to resign the office of Secretary. He also assured them that he felt highly gratified at the kind manner in which they had received the resolution which the Council had thought proper to pass; and it was all the more gratifying as coming from those amongst whom he had worked, and who were therefore most competent to form an opinion respecting the value of his services.

Messrs. J. Ellis and J. Leather and Mr. Alderman Bennett were elected Members.

The SECRETARY exhibited one of Hessel's Gas Heat Disseminators for warming rooms, and he also read the minutes of the College of Physicians on the subject of the use of methylated spirit in pharmaceutical preparations.

Dr. THOMSON expressed his regret that the College of Physicians should have passed such resolutions, observing that they should have appointed censors to inquire into the nature of the spirit before they so strongly expressed their disapproval of its use.

Mr. ABRAHAM expressed his concurrence with Dr. Thomson's remarks.

The CHAIRMAN and Dr. EDWARDS defended the course which had been taken by the College, on the ground that the public welfare required the adoption of such a course, that being at present sold as tincture which was not tincture at all, and perhaps used in cases in which it ought not to be used.

Thursday, 17*th Dec.*, 1857.

Dr. EDWARDS delivered the concluding lecture on "Heat in its relation to Pharmacy." The subject of the present lecture was especially the management of heat. Practical remarks were made on the nature of fuel, the construction of furnaces, the use of spirit and naphtha lamps, of gas burners constructed for heating purposes, of which a variety of arrangements were shown. The principles of combustion were then explained, and illustrated by a variety of experiments. The blowpipe and its value was next discussed, and the oxyhydrogen blowpipe explained, and Maugham's jet recommended. By a powerful apparatus, the powers of this source of intense heat were exhibited with brilliant effect. An interesting discussion followed on the merits of a new Gas Stove introduced by Mr. Hessel, in the course of which Dr. Edwards, while admitting the excellence of the arrangement as a rapid and economical source of heat, recommended great caution in its use in small apartments, the air of which it would rapidly vitiate, as the whole of the poisonous products of combustion were thrown into circulation with the heated air.

MEETING AT MANCHESTER ON THE POISON BILL.

A MEETING of the Chemists and Druggists of Manchester and Salford was held in the Mechanics' Institution, on Wednesday, December 9, to consider the provisions of the Sale of Poisons Bill. On the motion of Mr. Roberton, seconded by Mr. V. Pickup, Mr. Standring was called to the chair, who, after explaining to the meeting the objects for which it was called together, requested Mr. Wilkinson to read the clauses of the Act, which having been done, a discussion followed, several members expressing great objection to its provisions. A resolution was moved by Mr. W. S. Brown, and seconded by Mr. W. H. Lamb, which, after some discussion in which Mr. Slugg and others took part, was somewhat modified from the origina terms, and carried unanimously, to the following effect :—

"That this meeting, considering the provisions of the Sale of Poisons Bill to be very objectionable in principle, impracticable in many of its details, and calculated to cause great inconvenience to the public, recommends the appointment of a Committee, to watch its progress, and take such steps as may be necessary by petition, public meeting, or otherwise, to protect the interests of the trade, and also to co-operate with the Chemists of London and other cities, and with the Committee of the Pharmaceutical Society, appointed for the same purpose."

Mr. Mumbray moved the appointment of the Committee, which was seconded by Mr. Pyne, and after some discussion, in which Messrs. Brown, Slugg, Mumbray, Peatson, Storey, and others took part, several names were added, and the following gentlemen unanimously chosen:—Messrs. Brown, W. H. Lamb, Lynch, Peatson, V. Pickup, Mumbray, Slugg, Standring, Taylor, Wilkinson, Woolley.

It was then proposed by Mr. Wilkinson, seconded by Mr. Slugg, and carried unanimously:—

"That a subscription of 5*s.* from each person present should be entered into, for the purpose of defraying the expenses incurred, and that the other members of the trade should be solicited to contribute their quota."

A vote of thanks to Mr. Standring, for his services as Chairman, was proposed by Mr. W. S. Brown, seconded by Mr. Roberton, and carried unanimously; after which a considerable number of the gentlemen present handed in their subscriptions.

A meeting of the Committee was held subsequently, and it was moved by Mr. Lynch, seconded by Mr. W. H. Lamb, "That Mr. Standring be appointed Chairman."

Moved by Mr. Pickup, seconded by Mr. Slugg, "That Mr. W. Wilkinson be appointed Secretary."

Moved by Mr. Slugg, seconded by Mr. Peatson, "That Mr. Lynch be appointed Treasurer."

PHARMACY IN VICTORIA, MELBOURNE.

The *Pharmaceutical Journal* for June, 1857, contains an account of the formation of a Pharmaceutical Society, with some of the circumstances which led to it. The annexed communication officially announces its successful establishment, and proposes regular correspondence with the parent Society. A copy of the laws and regulations has been received, which, in general principles, resemble those of the Pharmaceutical Society of Great Britain in a considerably condensed form. The subscription from Members is two guineas annually, from Associates one guinea. A copy of the proposed Bill for regulating the safe keeping and sale of poisons is subjoined. Although that measure is withdrawn, and not likely to be re-introduced in its present form, it may be interesting for future reference, showing as it does to what lengths visionary and theoretical men will sometimes go when they get out of their depth in a subject with which they are not practically familiar. It also shows what kind of legislation Chemists may be prepared to expect in case they should neglect the duty of maintaining an Association for regulating their own branch of the profession.

Melbourne, Victoria, 5, Collins Street East, 15th Sept., 1857.

To the Secretary of the Pharmaceutical Society, Great Britain, &c.

Sir,—I am requested by the President and Council of the Pharmaceutical Society of Victoria, to inform you officially that such a Society has been established in this colony.

The continued interference of the medical body, more particularly their recent attempt to pass through our Legislative Assembly a "Poisons Bill" (a copy of which I enclose), which was considered absurd and obnoxious in the extreme, roused the Chemists and Druggists to resistance, which, I am happy to say, was successful as far as the Bill is concerned, and ended in the establishment of the Pharmaceutical Society.

We are now fairly afloat; scarcely a Chemist in the colony has neglected to join; and we hope, if at ever so humble a distance, to follow the steps of the parent Society in England.

Our first effort will be to establish a monthly meeting of our body, for the discussion of subjects in connexion with our business ; and we intend to publish (at least quarterly) our "Transactions," a copy of which I will regularly forward to you.

I am also directed to inform you that the Council will be most happy to give the Society in England any information they may require, or transmit specimens of any of our indigenous productions for your Museum.

We shall not for some time be in a position to have a Museum of our own, but we look forward to the accomplishment of this object. We shall then be glad to apply to our brethren at home for assistance.

I beg to enclose you a copy of our rules.

We have transmitted to England money to purchase the *Transactions of the Pharmaceutical Society* to date. If not against rule, the Council would be glad to have a copy sent from your office monthly.

We hope at the next session of our Parliament to get a Bill, somewhat resembling your Pharmacy Bill, passed. This will give us a standing, and prevent our being interfered with by the medical men in future.

Some of the Members of our Society (old Members of the Society in England) having expressed a wish to re-join your Society, I am requested to ask you if they can be admitted, and upon what terms. The Council think that Members subscribing to our Society here, might perhaps be admitted as Life Members upon payment of a small sum ; such sum to be increased, should the party ever return to England and commence business. Perhaps you will lay this matter before your Council.

Yours very respectfully,

J. Lewis, *Secretary.*

A Bill *to regulate the* safe keeping *and* sale *of* Arsenic *and other* Poisons, *and their* administration.

Whereas the careless keeping and unrestricted sale of poisons and their administration facilitate the commission of crime : Be it enacted by the Queen's Most Excellent Majesty, by and with the advice and consent of the Legislative Council and Legislative Assembly of Victoria, in this present Parliament assembled, and by the authority of the same, as follows :—

I. Every person who shall have in his possession or charge any of the poisons enumerated in Schedule A, shall keep the same under lock and key in secure packages, duly labelled, and with the word "Poison" legibly and visibly inscribed upon the same, and in a place solely dedicated to the keeping of poisons ; and shall destroy by burning all empty casks, bags, or other packages which have contained such poisons. Provided that nothing in this clause shall prevent the keeping of such poisons with drugs or medicines in the same medicine chest, or other place dedicated to or used for the keeping of medicines for private or family use, without the necessity of separate place thereof.

II. Every retail dealer having any of the poisons enumerated in Schedule A in his shop or other place of business, shall keep the same in square bottles of a green colour, duly labelled with the word "Poison," in yellow letters on a white ground, on each bottle ; such poisons to be kept apart from other drugs under lock and key.

III. Every person who shall sell any of the poisons enumerated in Schedule A, except on the prescription of a legally qualified medical man, shall duly label the same, and inscribe the word "Poison" on the face of the package, and shall record the particulars, as set forth in Schedule B attached to this Act, in a book to be kept for this purpose ; and any person selling any of the before mentioned poisons enumerated in Schedule A, in quantities likely to prove dangerous to life, shall satisfy himself of the respectability of the party or parties purchasing the same.

IV. No person being the keeper of a lodging-house or licensed public-house shall, under any pretence whatever, administer any of the poisons enumerated in Schedule A to any person in his house, except under the advice of a legally qualified medical man ; and any such person having any of such poisons on his premises (although the same shall be duly labelled as hereinbefore provided for), unless so authorized under advice as aforesaid, shall be subject to a penalty under this Act.

V. No person, not being a parent or guardian, shall administer laudanum or any other narcotic to any child under five years of age, except ordered by a legally qualified medical practitioner.

VI. Any person guilty of a breach of this Act, shall, upon conviction before two justices of the peace, be subject for every offence to a penalty of not more than £25, nor less than £5, and in default of payment be imprisoned for not more than three months.

SCHEDULE A.

Arsenic—Strychnine—Opium—Morphia—Laudanum—Dover's Powder—Oxalic Acid—Corrosive Sublimate—Oil of Bitter Almonds—Prussic Acid—Sugar of Lead.

SCHEDULE B.

Date of Sale.	Name and Surname of Purchaser	Purchaser's Place of Abode.	Condition or Occupation.	Name and Quantity of Poison sold.	Purpose for which required.	Purchaser's Signature. If he cannot write, the Seller to put here the words "cannot write."	Witness's Signature and Place of Abode.	Seller's Signature and Residence.
Jan. 29, 1857.	John Thomas		Farmer	Arsenic 5lbs.	To steep wheat.	John Thomas	Edward Jones, Grove Fern, Brighton	James Jackson Melbourne.

AMERICAN PHARMACEUTICAL ASSOCIATION.

In our number for November, we gave a brief notice of the annual meeting of the American Pharmaceutical Association, which was held at Philadelphia in September, 1857. Not having at that time received a complete report, we were unable to give the following reports of the Committees, which we have now selected from those presented to the Association, as being likely to interest our readers:—

REPORT OF THE COMMITTEE ON THE NEXT DECENNIAL REVISION OF THE PHARMACOPŒIA.

That we should have a part in the decennial revision of the Pharmacopœia is pre-supposed by the resolution under which we stand appointed, and is in fact generally conceded; but how the cumbrous machinery of a national organization can be adapted to a work requiring such constant comparison of views and so many precautions and experimental researches, claims, and has received, our deliberate consideration. As a result of this, we are prepared to recommend the following propositions:—

1st. That a Committee of ten (10) members shall be appointed at the present meeting to represent the pharmaceutical knowledge and skill of the Northern, Southern, Eastern, and Western States, in a preliminary revision of the Pharmacopœia.

2nd. The members of this Committee shall transmit to its Chairman, at least two months before the assembling of the Association in 1858, such additions, modifications, and omissions, as a careful study of the Pharmacopœia, and their knowledge of the wants of their several localities, and of the profession at large, may suggest. From these the Chairman shall compile a report.

3rd. At the meeting in 1858, the report of the Committee of ten shall be received, but not acted on finally. It shall be referred to a Committee of three, elected by the Association, who shall thoroughly revise it, and subject each item to criticism and the test of experiment. They shall, at their discretion, omit or modify any of its parts, and make report at the meeting in 1859, when their proposed modification of the Pharmacopœia shall be finally acted on by the Association, and if adopted, directed to be forwarded to the Convention for revising the Pharmacopœia, to meet in Washington in May, 1860.

4th. The Association not being included in the classes specified as entitled to representation in the Pharmacopœial Convention, it is recommended that the report or the revision, after being adopted by it, shall be placed in the hands of the delegates from one of the Incorporated Colleges of Pharmacy, to be by them offered to the acceptance of the Convention.

Your Committee believe that whatever might be the fate of the modifications

suggested in this way to the Convention and its Committee, good would undoubtedly result from a plan adapted to draw out so free an expression from the widely separated localities represented, and to subject these to a rigid examination in the hands of a competent Committee of revision.

Believing that this Association, representing, as it does, a large body of those for whom the Pharmacopœia is ordained, and who have no other channel through which to be represented in its revision, will naturally be looked to in the future, to co-operate in giving authority to our National Code ; and that the important interests it has in charge, generally, will be promoted by giving to its organization the sanction of law, and such a permanence of location as will not entirely interfere with its migratory character ; it is suggested that a charter should be obtained from Congress, and a permanent depository established in Washington, D. C., at which capital the meetings should be held at intervals of perhaps five years, the intermediate meetings being changed annually as at present.

These suggestions, though not strictly within the scope of this report, are induced by the prospect of a representation in the Pharmacopœial Convention, and are submitted for the consideration of the Association, by

EDWARD PARRISH,
W. B. CHAPMAN,
SAML. M. COLCORD,
JOHN MEAKIM.

REPORT ON DRUG EXAMINERS.

The Executive Committee made a special report in reference to the subject of Drug Examiners, in obedience to a duty referred to them last year. From the report it appears that the Committee addressed a letter on behalf of this Association to the Hon. Howell Cobb, Secretary of the Treasury, and similar action was taken by the Massachusetts College of Pharmacy, backed by the Medical Society of that State, which appears to have received no consideration, as since that event the long-tried Examiner at New York has been displaced, under circumstances which convince the Committee that Government continues to look upon the office of Examiner of Drugs as a fitting reward for political partisans, rather than as a highly important guardianship of one of the most important interests of the whole country.

AN APPEAL TO THE PHARMACEUTISTS AND DRUGGISTS OF THE UNITED STATES ON THE SALE OF POISONS.

The American Pharmaceutical Association, at the suggestion of a Committee appointed by it to report upon "*the subject of the Sale of Poisons*," does respectfully submit to the Pharmaceutists and Druggists of the United States the following suggestions, in relation to regulating the sale of poisons:—

From the diversity of opinion among Pharmaceutists in relation to the value and force of direct legislative action in restricting the sale of poisonous substances, the Association does not deem it desirable to attempt at present the passage of laws in the different States bearing upon the subject; but, in place, offers to the Pharmaceutist such suggestions as are deemed expedient under existing circumstances.

The Association suggests, That the Pharmaceutist should adopt rules in dispensing of poisons, by which he may remove from himself the responsibility of selling poisons for disreputable purposes, and protect the public, both from mistakes occurring in his own premises, and from the use of poisons for unlawful and criminal purposes.

The Association therefore offers the following suggestions:—

That, in selling any substance which would prove fatal in a dose of 60 grains by weight, or a fluid drachm by measure, you consider it *poisonous*, and mark the word "poison" in a distinct and unmistakable manner upon the label or package.

That you consider the poisonous alkaloids and the like powerful substances *deadly poisonous*, and so mark each package or label.

That you make it an invariable rule to have every package of medicine dispensed at your counter plainly marked, whether it be an innocent or poisonous one.

That you, for the purpose of distinguishing by the aid of colour as well as words, have the labels of the furniture of your establishment which contains poisonous substances (as designated in this paper) of a peculiar colour,—one distinct from that of the rest of your labels. That you keep such furniture by itself, in order that it may not cause remark by customers; or that, in place of this suggestion, you adopt

the practice of placing upon each bottle, or drawer, or package, of such poisonous substances, some symbol—such as a bright red piece of paper, a triangle, or Greek cross, or of other suitable form—thus giving the eye an additional means of cautioning you when handling such substances.

That you print your dispensing labels for poisons upon a paper of an entirely distinct colour from that upon which your ordinary ones are printed.

That in dispensing prescriptions containing poisonous substances, while you cannot mark such "poisonous" unless so directed to do by the writer of the recipe, yet by marking a symbol in red ink upon the label of the medicine you may avoid any mistake in its re-preparation, in putting up a poisonous for an innocent one.

That, as an additional precaution, you adopt the practice of placing bands of rubber around the necks and over the stoppers of bottles containing poisonous medicines in frequent use, or in some other manner delay slightly the opening of the bottle, so as to form an additional security and caution against mistake

That in preparing prescriptions you adopt this course: first, carefully and understandingly read the recipe; then prepare it; then copy the recipe into a book provided for the purpose, with its date, name of prescriber and name of patient, and directions; finally, place the number corresponding to the one on record upon the original recipe and the label, before delivering the medicine. In this way any possible error in first reading the recipe may be discovered in recording it; and secondly, you have a guide in the patient's name, by which you may avert evil consequences, should an error be discovered after the medicine has left the store.

That you provide yourself with a book, in which to record every sale of poison; stating in each entry the date of sale, to whom sold, for what purpose desired, the quantity sold, and price received. This can be used as evidence in case of any blame being attached to you in case of accident resulting from articles purchased of you.

That you consider yourself morally responsible to the community in which you live, when there may be no legislative control to the sale of poisons, and that you be particular when furnishing poisons to applicants for such, to assure yourself by the appearance of the customer and by proper inquiry of them, that no disreputable, illegal, or criminal purpose is intended.

That you require a written order from a physician or other responsible party to accompany any application for a poisonous substance presented by a person under fifteen years of age.

That in all cases in dealing out poisons in your business to applicants in person, you be particular to caution them in regard to the properties and proper methods of employment of the substance which they are to receive.

That you entirely refuse to dispense oils of savine and tansy, of ergot, and of substances of similar effect upon the economy, unless upon the written prescription of a physician.

The Association is led to believe that no legislation upon this subject, however strict, will completely protect the public against the acts of the evil-doer, in employing poisons to attain his purpose. Yet it trusts that this appeal to Pharmaceutists, many of whom may not yet have felt the force and weight of the responsibility resting upon them, will awaken them to a sense of their accountability, morally and otherwise, and be conducive to individual safety and public welfare.

ORIGINAL AND EXTRACTED ARTICLES.

THE POISON BILL.

BY MR. JOSEPH INCE.

The demands of a great national question cannot be fairly met by an attention, however laudable, to minor details; nothing indeed is more to be regretted in the lately proposed Bill to regulate the sale of poisons, than that its provisions are based on secondary considerations, and not on some leading general principle. Sufficient has been said already in condemnation of sundry suggestions which the Bill contains, and half the Society has had its fling at the angular vagaries of the Bottle Imp; but I cannot join in the astonishment

expressed at the impossibilities the Chemist has been asked to undertake. Suppose the Council, actuated by some strange motive, were to meet to decide upon the quality of cloth, to assign a price to the workmanship, and determine the exact length of the Sydenham trousers. Would not nine tailors rise instantly as one man, and protest against the measure? And yet in the height of their indignation, not one of the collective nine would wonder at a few professional mistakes, for there is a necessity as well as wisdom in minding one's own affairs. The requirements of actual trade arrangement can only be rightly appreciated by the working man. Government must gain its slightest insight into such matters from behind the counter—the last place it is likely much to go. No argument is needed to demonstrate how visionary must be all conclusions, that at best are drawn from information received at second hand.

It remains yet to show that the details of the Bill are not only impracticable, but unimportant. Two elements are conspicuous in an English Druggist's shop—Trade and Pharmacy, nor would it be an exaggeration to say that those establishments form the majority in which the trade element is in the ascendant. Various circumstances determine this: the claims of locality and competition, special business facilities as well as personal character. An Englishman likes business on its own account; he loves its wear and tear, its railway bustle, and the dissolving view in the distance of an increasing income. In all such houses (and let it be understood they are not mentioned here with one shadow of either blame or ridicule) it is self-evident that a compulsory rigid attention to technical order and arrangement would be unimportant, because greatly out of place.

A poison cupboard may have advantages: it may be a safer and more convenient plan to separate the dangerous from the less potent alkaloids—to keep Prussic Acid under lock and key—to banish Arsenic to one distant spot, and exile Oxalic Acid to another—to give a distinctive place to Aconite, Henbane, and Hemlock, and institute whatever salutary precautions a careful master and an active carpenter deem expedient. A place for everything, and everything in its place is the motto of the Chemist; but dire would be the perplexity of a Commission imbued with the one idea of a classified arrangement, as the select list of objects not included in the schedule met their view. Would they not begin to hesitate whether their kind endeavours were likely to effect much good, and whether also the paramount importance attached to the minutiæ of ultra Pharmacy had not been overrated? Under what head would they specify the long catalogue of sundry merchandise? how class the museum of Art Treasures so liberally exhibited for nothing in the window? Where put the Venus rising from the sea with no other garment than a galvanic battery over her more salient points?

Moreover, were this personal interference once allowed, can any Chemist assign the exact limit where Government control would stop? What reason could there be why the same power should not proceed to order the choice of drugs, and to define the nature of the preparations used? Such an un-English notion will never suit our shores, nor will it tend to increase the equanimity of our island minds. It may establish a principle, but is sure to create a panic.

Still less applicable and equally unimportant are the regulations of the Bill, in the case of those houses which depend on Pharmacy alone; for the simple reason, that establishments of this class have adopted long ago most of the different precautions that are so strongly advocated. No establishment has yet, or ever will hereafter, become great by accident. Success is owing to the individual skill of each proprietor. His honour, ambition, and self-interest lead him to choose such methods as practical and long experience has suggested. Let *him* be the judge of the best way of arranging and vending poisons, since no man knows better than the working Chemist how absolutely without value are any universal, arbitrary directions which are controlled

and modified by a crowd of attendant circumstances. One sells Arsenic in pounds, a second Opium, a third has a demand for neither. What mathematician is to apportion the requisite rule of three?

But if it be not so—if still a law be necessary to dive into the private operations of the Druggist, then one of two theories must be entertained: either it is the deliberate opinion of the Government that Chemists, as a body, are careless and inattentive; or else, notwithstanding the years that Pharmacy has been pursued in England, they are not at the present moment capable of arranging their own bottles. Surely there is no necessity to defend the Chemist from the charge of carelessness—the all-enduring man, the Hercules of minute attention! This is the last fault to be laid at his ever-open door. And as to trade arrangement and technicalities, he is either to be safely trusted to manage as it suits him best, or he is unfit to occupy a position at once so difficult and so responsible.

Before bringing the argument to its natural and inevitable result, it ought to be clearly understood that the object contemplated in this discussion, is the best method of checking *accidental*, not criminal poisoning. The man who, with sinister and malicious purpose, is bent on destroying another's life, will effect his object at all risks and hazards. Should his coward thoughts have shrunk from actual murder, and the fiend within him whispered Poison, Poison he will have; and no regulations, however wise, will hinder, no elaborate entry of the noxious substance will effectually mar his plan; nor will a wondrous label be a sufficient safeguard, though cut into fantastic shapes, and printed in all the colours of the rainbow. Criminal poisoning is a religious question—an affair of morality, not Physic.

The point for consideration is, whether any barrier can be set up, which, by its restrictive power, may ensure the public welfare; whether any scheme may be so devised as to lessen the dangers arising from inadvertence, and how far we may reasonably expect to banish the word Accidental Poisoning from our vocabulary.

The usual refuge for the well-meaning but superficial mind, is found in the observation that we must look for safety in the better education of the community of Druggists. This elegant moral sentiment is like a bridge built half way over the river, it has the merit of the best intentions, but it does not go far enough. Personal and private culture may raise a Chemist as high in the intellectual scale as Dalton, but it will not affect the sale of Arsenic. I believe the sole remedy exists in the establishment of a legally-constituted, authoritative, educating Society. Let it once be known that no man who has not complied with its regulations and received its diploma shall be permitted to call himself a Chemist, and practise Pharmacy; that no man, unless duly qualified by the ordeal of its examination, shall be allowed to exercise a calling which demands the utmost skill, and the most accurate knowledge; that no man unauthorized by its sanction shall complacently vend the deadliest substances, in the deadliest ignorance; but that the sale of such dangerous remedies shall be restricted to legally as well as mentally qualified persons, and then the public may breathe once more, and the Council of the Society cease to discuss important subjects as amateur philosophers. A class of men will instantly be created who, both from their position and their education, will feel the full responsibility of their onerous duties, and to whom the practical working out of these difficult questions may safely be committed. The huckster, oilman, and fancy Chemist will be driven to resume their own legitimate occupations, and the true Pharmaceutist will be able to get a living even without the sale of brushes. Let the Government leave the trade details of the shop untouched, and select the men: the one act is police interference, the other—legislation.

31, *Southampton Street, Covent Garden*

REPORT OF THE

RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,

AND OF THE

APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

BY B. H. PAUL, P^{h} D.

(*Continued from p.* 323)

Nitroform, $C_2[NO_4]_3H$.—Colourless cubic crystals; melts above 15° C.; dissolves readily in water with yellowish colouration. It has a disagreeable smell and bitter taste; is decomposed at 100° C.; takes fire readily; and, when suddenly heated, explodes. This substance has the characters of an acid; the salts are crystallizable, yellow, explosive, and readily decomposable. It was obtained* from trinitro-methyl ammonium, $C_2[NO_4]_3\,NH_4$, by the action of sulphuric acid. This latter substance was obtained by the reaction of alcohol or water with ($C_4\,[NO_4]_3\,N$) trinitro-acetonitril or cyanide of trinitro-methyl ($C_2\,[NO_4]_3$, C_2N.)

By the reaction of acetonitril ($C_4\,H_3\,N$) with caustic potash, a yellow crystalline substance is produced, which, with concentrated sulphuric acid, yields nitroform.

Direct Combination of Hydrocarbons with Hydracids.—Ethylene ($C_4\,H_4$) and propylene ($C_6\,H_6$) have already been converted directly into the corresponding alcohols, by the determining influence of sulphuric acid. The other homologous hydrocarbons have not yet been combined directly with water. M. Berthelot† has, however, succeeded in effecting their combination with hydracids. Propylene heated for seventy hours with aqueous hydrochloric acid to 100° C., in a sealed flask, yields $C_6\,H_7\,Cl$, and the combination takes place even at the ordinary temperature, but more slowly. A similar combination takes place with hydriodic or hydrobromic acid, and in this way the chloride, bromide, or iodide of propyle is produced.

Amylene, $C_{10}\,H_{10}$, and caprylene, $C_{16}\,H_{16}$, also yield similar compounds. Caprylene absorbs hydrochloric acid gas at the ordinary temperature; seven times its volume in two hours, fifteen times its volume in twenty-five days.

Ethalene, $C_{32}\,H_{32}$, behaves in a similar manner at the ordinary temperature and at 100° C., but the chloride produced is decomposed by distillation.

Ethylene is completely absorbed by a saturated water solution of hydrobromic acid.

Formula for Oxalic Acid, $C_4\,H_2\,O_8$. By the oxidation of glycol $C_4\,H_6\,O_4$, there are produced glycolic acid—identical or isomeric with homolactic acid and homologous with lactic acid $C_6\,H_6\,O_6$—together with oxalic acid and carbonic acid, the latter originating from the decomposition of a portion of the oxalic acid.‡

$\left.\begin{matrix}C_4\,H_4\\H_2\end{matrix}\right\}O_4$	$\left.\begin{matrix}C_4\,H_2\,O_2\\H_2\end{matrix}\right\}O_4$	$\left.\begin{matrix}C_4\,O_4\\H_2\end{matrix}\right\}O_4$
glycol.	glycolic acid.	oxalic acid.

This is a relation precisely similar to that between alcohol and acetic acids.

$$\left.\begin{matrix}C_4\,H_5\\H\end{matrix}\right\}O_2 \qquad \left.\begin{matrix}C_4\,H_3\,O_2\\H\end{matrix}\right\}O_2$$

the conversion consisting in the substitution of oxygen for hydrogen in the radical. Hence oxalic acid is a derivative of glycol and of ethylene, in the same way that acetic acid is a derivative of alcohol and ethyl, consequently, oxalic acid must contain four atoms of carbon like acetic acid, and is to be regarded as a bibasic acid. This view is moreover supported by the fact that oxalic acid forms acid and double salts like tartaric acid, and also by the analogy with other acid containing eight atoms of oxygen:

Oxalic.	?	Succinic.	Adipic.	Pimelic.	Suberic.	Sebacic.
$C_4\,H_2\,O_8$	$C_6\,H_4\,O_8$	$C_8\,H_6\,O_8$	$C_{12}\,H_{10}\,O_8$	$C_{14}\,H_{12}\,O_8$	$C_{16}\,H_{14}\,O_8$	$C_{20}\,H_{18}\,O_8$

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* Leon Schiskoff, *L'Institut*, 1857, No. 1230.

† *Comptes Rendus*, xliv., 1350.

‡ Wurtz, *Comptes Rendus*, xliv., 1306.

Compound-ether derivatives of the Cetyl and other Series.—

Ethyl-cetyl ether $C_{32} H_{33}$ } O_2 / $C_4 H_5$ } O_2 — Crystalline; melts at 20° C.; soluble in alcohol and ether. Obtained by boiling alcohol solution of sodium alcohol with iodide of cetyl.

Amyl-cetyl ether $C_{32} H_{33}$ } O_2 / $C_{10} H_{11}$ } O_2 — Crystalline; melts at 30° C. Obtained in the same manner as the above.

Aceto-cetyl ether $C_{32} H_{33}$ } O_2 / $C_4 H_3 O_2$ } O_2 — Crystalline; melts at 18°.5. Obtained by the reaction of acetic acid and hydrochloric or sulphuric acid with cetyl alcohol.

Benzo-cetyl ether $C_{32} H_{33}$ } O_2 / $C_{14} H_5 O_2$ } O_2 — Crystalline; melts at 30° C.; soluble in ether, sparingly in alchol. Obtained by the reaction of cetyl alcohol and chloride of benzoyl.*

Inverse Substitution.—The substitution of hydrogen for chlorine, bromine, or iodine has been effected—

1. By reaction with potassium amalgam and water. (Melsens.)
2. By electrolysis, with zinc as electrode. (Kolbe.)
3. By reaction with zinc in the presence of water.
4. By reaction with mercury and hydrochloric acid;† thus—

Iod-propylene $C_6 H_5 I + 2 Hg + H Cl = C_6 H_6 + Hg I + Hg Cl$.

5. By direct action of hydrogen. When chlorinized compounds corresponding to the hydrocarbons are heated to dull redness with hydrogen, hydrochloric acid and hydrocarbons are produced. A part of the latter escapes decomposition. In this way the chlorides of carbon, $C_4 Cl_4$, $C_4 Cl_6$, yield an appreciable amount of olefiant gas. $C_2 Cl_4$ yields marsh gas and olefiant gas. $C_{20} Cl_8$ yield naphthalin, $C_{20} H_8$. $C_2 Cl$ yields a large amount of a substance presenting all the characters of naphthalin, but no sensible amount of other hydrocarbons. This chloride is so stable and differs so much from the olefiant gas series, that it is probably chlorinated chlor-naphthalin $C_{20} Cl_8 + Cl_2$.

6. By the action of nascent hydrogen.

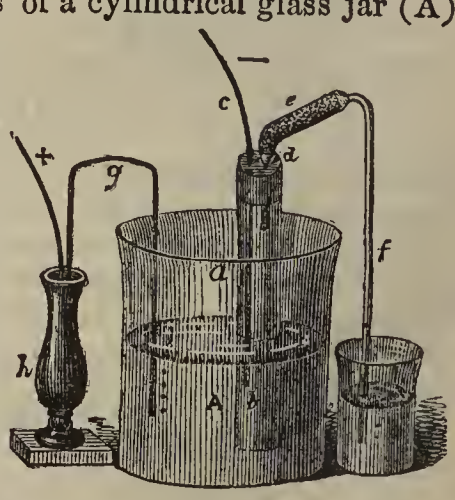
$C_4 H_4 Br_2$ heated to 275° C. with copper, water, and iodide of potassium, yields olefiant gas. With water and iodide of potassium it yields $C_4 H_6$. $C_6 H_6 Br_2$, $C_8 H_8 Br_2$, and $C_{10} H_{10} Br_2$ undergo similar changes.

Dutch liquid chloroform, bromoform, iodoform, and bromated brom-propylene, $C_6 H_5 Br_3$, give similar results.

Trichlor-hydrin, $C_6 H_5 Cl_3$, yields, when heated with iodide of potassium, copper, and water, $C_6 H_6$ and $C_6 H_8$ with hydrogen and carbonic acid.

Ozonized Hydrogen.—Prof. Osann‡ has some time since observed, that electrolytic hydrogen exercises a more powerful reducing action than that obtained in the usual way. Recent experiments have shown that a necessary condition of the production of ozonized hydrogen is the use of freshly-distilled Nordhausen sulphuric acid. When the diluted acid is kept for some days, it no longer yields ozonized hydrogen.

The apparatus used in these experiments consists of a cylindrical glass jar (A) for containing the electrolyte; a glass tube (*a*) containing a strip of platinum (*b*) attached to the stopper, and connected with a platinum wire (*c*), which forms the negative electrode. The bent tube (*e*) is closed at both ends with bladder, filled with fragments of glass saturated with a solution of sulphate of silver, and fitted with a discharge tube (*f*). The positive electrode consists of a stout platinum wire (*g*), dipping into the mercury vessel (*h*).



When this apparatus is connected with a battery, the electrolytic hydrogen passing through the tube (*e*) causes a reduction of the sulphate of silver, indicated by the brown coloration of the fragments of glass.

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* G. Becker, *Annalen der Chemie und Pharmacie*, cii. 219.

† Berthelot and De Luca. *Comptes Rendus*, xliv., 1246, 1349.

‡ *Verhandl. d. Würtzb. Phys. Med. Ges.*, viii. 180.

Prof. Osann is of opinion that this action cannot be ascribed to an impurity of the electrolytic hydrogen; because, when the mixture of acid and water is made with sulphuric acid that is not freshly distilled, there is no reduction of the silver salt, although with the same acid freshly distilled, reduction is effected. In order to prove the absence of selenium in the hydrogen, he burnt the gas with a small glass vessel inverted over the flame, and found that the water condensed on its sides was not acid, which would have been the case if selenium were present, owing to the production of selenic acid.

Contact with finely-divided platinum was also found to communicate to hydrogen the power of reducing silver salts.

Monochloracetic Acid—$C_4 H_3 Cl O_4$.—Dr. Hoffmann* finds that this substance is produced by the action of dry chlorine upon the vapour of glacial acetic acid, at 250° F. The reaction takes place more readily under the influence of light. Probably, even in the dark, at the ordinary temperature, some monochloracetic acid is produced by the contact of chlorine and acetic acid; and in direct sunlight, at 212° F., the reaction is considerable. The reaction decreases in proportion as monochloracetic acid is produced. This substance crystallizes in rhombic plates and prisms. It melts at 144° F., and boils at 370° F. Its density in the liquid state is 1.395 at 163°.6 F., in relation to water at the same temperature, and 1.366, in relation to water at 66° F. It has scarcely any smell, is very deliquescent, readily soluble in water, producing considerable reduction of temperature, and may be distilled without decomposition.

The potash salt, $C_4 H_2 Cl KO_4 + 3 H O$, crystallizes in thin colourless laminæ, and is very soluble, but not deliquescent. The solution is decomposed by heat.

The acid potash salt, $\left.\begin{matrix} C_4 H_2 Cl K O_4 \\ C_4 H_3 Cl \quad O_4 \end{matrix}\right\}$ is sparingly soluble in water.

The baryta salt, $C_4 H_2 Cl Ba O_4 + 2 HO$, crystallizes in rhombic prisms, and the solution is not much decomposed by heat.

The silver salt is anhydrous, very sparingly soluble in cold water.

Monochloracetic acid is not decomposed by heating with alkalies, in the same manner as acetic and trichloracetic acid, which yield respectively marsh gas, $C_2 H_4$, and chloroform, $C_4 H Cl_3$, with carbonate of the alkali. One of the products is alkaline chloride; the other, Wilms† supposes to be acetic acid; but Dr. Hoffmann states that the liquid does not contain either acetic, formic, or oxalic acid, nor is any gas evolved. Probably a substance having the composition of glycolic acid, $C_4 H_4 O_6$, may be produced by introduction of 2 HO.

Monochloracetic acid obtained in this way, was always accompanied by a small amount of a higher chlorinated acid. Dr. Hoffmann was unable to determine whether this was bichloracetic acid. Oxalic acid was not produced. Dr. Hoffmann was unable to separate the chloride of chloracetyl, $C_4 H_2 Cl_2 O_2$, from the oxychloride of phosphorus, produced by the reaction of pentachloride of phosphorus upon this substance, owing to their boiling points being so near. M. Wurtz‡ has, however, obtained this chloride by the direct action of chlorine upon chloracetyl. It is a colourless liquid, with pungent odour; density 1.495, at 32° F.; boiling point at 221° F. It is rapidly decomposed by water, with evolution of heat; monochloracetic acid and hydrochloric acid being produced. It absorbs dry ammonia, rapidly producing monochloracetamide ($C_4 H_4 Cl O_2 N$) and chloride of ammonium. With alcohol it yields monochloracetic ether ($C_4 H_2 Cl Ae O_4$) and hydrochloric acid, which crystallizes in laminæ, is soluble in 10 parts of water, and in 10.5 parts alcohol, at 24° C. This is a colourless liquid, insoluble in water, denser than water, boiling point 143.5, vapour density 4.46. With potash it yields alcohol and monochloracetic acid, showing that, as compared with acetate of ethyl, it contains chlorine in the acid group and not in the ethyl group.

M. Wurtz§ finds that by the action of chlorine upon aldehyde $C_4 H_4 O_2$ no chloral $C_4 HCl_3 O_2$ is produced but chloracetyl $C_4 H_3 Cl O_2$, and a substance whose composition corresponds with the formula $C_8 H_7 Cl O_4$. This is an oily liquid, denser than

* *Ann. Chem. Pharm.*, cii. 1.
† *Ann. Chim. Phys.*, 3, xlix., 97.
‡ *Ann. Chim Phys.*, xlix. 61.
§ *Ann. Chim. Phys.*, 3, xlix., 58.

water, boiling point from 120° to 130° C. M. Wurtz considers this to be a chlorinated product of metaldehyde $C_8 H_8 O_4$. The production of chloracetyl from aldehyde by the action of chlorine is analogous to the production of chlorbenzoyl from bitter almond oil.

Chloracetyl subjected to the action of chlorine does not yield chloral, but the chloride of chloracetyl $C_4 H_2 Cl_2 O_2$.

Phosphide of Nitrogen.—Dr. Pauli* states that when an intimate mixture of pentasulphide of phosphorus and chloride of ammonium is distilled, a light powder of a slightly yellow colour is obtained as a residue, which is phosphide of nitrogen. It is insoluble in water and nitric acid; when melted with potash it evolves ammonia, and is wholly converted into sulphide of phosphorus and ammonia by the action of dry sulphuretted hydrogen at a red heat. When melted with zinc ammonia is evolved. This substance was found to contain 1.49 per cent. hydrogen, consequently it must contain phosphamide, $PN_2 H$, as well as phosphide of nitrogen, PN_2. The same substance is produced when amorphous phosphorus and excess of sulphur are distilled with chloride of ammonium, or when a mixture of phosphide of calcium with sulphur and chloride of ammonium is distilled. The pentasulphide of phosphorus was prepared by melting together amorphous phosphorus and sulphur.

Amides of Phosphoric Acid.—Dr. Schiff† has examined these compounds of phosphorus with a view to ascertain whether the oxychlorides, or acichlorides of Berzelius, contain an inorganic radical that is transferable to other compounds. Gerhardt and Laurent have recently pointed out the analogy first recognized by Berzelius between the chlorides of organic radicals and these inorganic oxychlorides. Gerhardt regards oxychloride of phosphorus, $PO_2 Cl_3$, as the chloride of a tribasic radical phosphoryl, PO_2.

Triphosphamide, $PO_2 N_3 H_6$, is obtained by the action of dry ammonia upon oxychloride of phosphorus. The reaction is represented by the equation

$$PO_2 Cl_3 + 6\ NH_3 = 3\ NH_4 Cl + N_3 H_6 PO_2.$$

This substance is white, amorphous, difficultly decomposable by boiling nitric or hydrochloric acid. It is dissolved by concentrated sulphuric acid and by a mixture of sulphuric and nitric acids; the solution contains ammonia and phosphoric acid. By fusion with caustic potash it is converted into phosphate of potash and ammonia. Dr. Schiff regards this substance as a derivative of the type $N_3 H_9$, corresponding to triphosphate of ammonia; PO_2 occupying the place of these atoms of hydrogen.

Triphenylphosphamide, $PO_2 N_3 H_3 [C_{12} H_5]_3$, produced by the action of dry aniline upon oxychloride of phosphorus. It is a white substance, insoluble in water, much more readily decomposed than triphosphamide.

Trinapthylphosphamide, $PO_2 N_3 H_3 [C_{20} H_7]_3$ is a corresponding compound produced by the reaction of napthylamin and oxychloride of phosphorus.

Sulphotriphosphamide, $PS_2 N_3 H_6$, probably produced by the reaction of sulphochloride of phosphorus with ammonia. It is very readily decomposed.

Sulphotriphenylphosphamide, $PS_2 N_3 H_3 [C_{12} H_5]_3$. — Produced by the action of sulphochloride of phosphorus upon aniline; is a derivative of the type $N_2 H_6$.

Biphosphamide, $P_2 O_2 NH_3$. — This substance corresponds to the diphosphate of ammonia. It is the phosphamide of Gerhardt, and the bihydrated phosphide of nitrogen of Liebig and Wöhler. Dr. Schiff could not obtain it by the action of heat upon triphosphamide.

Monophosphamide, $PO_2 N$.—Produced by heating triphosphamide out of access of air. This substance is a derivative of the type NH_3, and corresponds to the monophosphate of ammonia. It is even less decomposable than triphosphamide. By fusion with potash it evolves ammonia. It is the biphosphamide of Gerhardt.

Boride of Nitrogen, BN, would seem to be the analogous derivative of tribasic boracic acid,

$$NH_4 O, 2HO, BO_3 — 6HO = BN;$$

but monophosphamide could not be produced in this way.

Dr. Schiff considers that the constitution of these substances may be simply represented by assuming the existence of a compound inorganic radical, PO_2, that may be substituted for 3H. This assumption is certainly opposed to the definition

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* *Ann. der Chem. u. Pharm.*, ci. 41.
† *Ann. der Chem. u. Pharm.*, ci. 299.

of organic chemistry as the chemistry of compound radicals; but since the distinction between inorganic and organic substances, so far as constitution is concerned, has, by recent investigations, been so much modified, there would seem to be a probability of advantage to be gained by a reverse application of the principle laid down by Berzelius, of taking the known facts of inorganic chemistry as a guide in the investigation of organic chemistry.

In Prof. Rose's investigation of phospham, he found that it always contained hydrogen; but was of opinion that this might be disregarded, and its composition represented by the formula PN_2. Gerhardt suggested the formula PN_2H. Its production would then be simply represented by the equation

$$2NH_4O, HO, PO_5 - 8HO = PN_2H.$$

A specimen of this substance prepared by Liebig and Wöhler on a previous occasion was found by Dr. Schiff to contain hydrogen. The substance obtained as a residue by heating sulphotriphosphamide does not contain any sulphur, and appears also to be phospham. Its production would be represented by the equation

$$PS_2 N_3 H_6 - NH_3 2HS = PN_2 H.$$

Phosphoric Ether, $3[C_4 H_5 O] PO_5$.—Produced by the action of oxychloride of phosphorus upon absolute alcohol, probably according to the equation

$$3[C_4 H_5 O, HO] + PO_2 Cl = PO_2 3[C_4 H_5] O_6 + 3HCl.$$

Ethyl phosphoric acid seems also to be produced at the same time.

Cloetz found that by the action of sulphochloride of phosphorus upon aqueous alcohol in the cold, sulphethyl-phosphoric acid $PS_2 [C_4 H_5] H_2, O_6$ is produced. When this substance is boiled with water ethyl phosphoric acid is produced and sulphuretted hydrogen evolved. But when sulphochloride of phosphorus is boiled with excess of alcohol an odour of mercaptan is evolved. Addition of water then separates an oil which does not contain phosphoric acid, and which boiled with nitric acid evolves sulphurous acid. Dr. Schiff considers it to be mercaptan, its production being represented by the equation

$$PS_2 [C_4 H_5] H_2, O_6 + C_4 H_6 O_2 = C_4 H_6 S_2 + PO_2 [C_4 H_5] H_2, O_6$$

in which case the decomposition would be analogous to that with water.

Oxychloride of phosphorus does not act upon phosphate of silver even in a chloride of calcium bath. It liberates iodine from iodide of potassium. With cyanide and sulphocyanide of silver there seemed to be a reaction.

Phosphuretted hydrogen did not seem to react with oxychloride of phosphorus.

Ammonia reacts energetically with anhydrous phosphoric acid, producing a substance of a reddish colour—probably owing to the presence of some amorphous phosphorus. It contains nitrogen, and is deliquescent. Aniline also yields a solid product with anhydrous phosphoric acid.

Assuming the existence of a radical, PO_2, in the tribasic phosphoric acid, the compounds of this radical may be represented as follows :—

Fundamental type—

$\left.\begin{matrix}H_3\\H_3\end{matrix}\right\}$	$\left.\begin{matrix}PO_2\\Cl_3\end{matrix}\right\}$	$\left.\begin{matrix}PO_2\\Br_3\end{matrix}\right\}$	$\left.\begin{matrix}PS_2\\Cl_3\end{matrix}\right\}$
	chloride of phosphoryl.	bromide of phosphoryl.	sulpho-chloride.
$\left.\begin{matrix}H_3\\H_3\end{matrix}\right\} O_6$	$\left.\begin{matrix}PO_2\\H_3\end{matrix}\right\} O_6$	$\left.\begin{matrix}PO_2\\PO_2\end{matrix}\right\} O_6$	$\left.\begin{matrix}PS_2\\H_3\end{matrix}\right\} O_6$	$\left.\begin{matrix}PS_2\\H_3\end{matrix}\right\} S_6$
	phosphoric hydrate.	phosphoric anhydride.	sulphophos-phoric acid.	persulphophos-phoric acid.
$N_3 \left\{\begin{matrix}H_3\\H_3\\H_3\end{matrix}\right.$	$N_3 \left\{\begin{matrix}PO_2\\H_3\\H_3\end{matrix}\right.$	$N_3 \left\{\begin{matrix}PO_2\\3\,[C_{12}\,H_5]\\H_3\end{matrix}\right.$	$N_3 \left\{\begin{matrix}PO_2\\3\,[C_{20}\,H_7]\\H_3\end{matrix}\right.$	$N_3 \left\{\begin{matrix}PS_2\\H_3\\H_3\end{matrix}\right.$	$N_3 \left\{\begin{matrix}PS_2\\3\,[C_{12}\,H_5]\\H_3\end{matrix}\right.$
	triphosph-amide.	triphenylphos-phamide.	trinapthyl-phosphamide.	trisulphophos-phamide.	triphenylsulpho-phosphamide.

$N_2 \left\{\begin{matrix}H_3\\H_3\end{matrix}\right.$ $\quad N_2 \left\{\begin{matrix}PO_2\\H_3\end{matrix}\right.$ = biphosphamide.—Gerhardt's phosphamite.

$N \left\{PO_2\right.$ $\quad N \left\{PO_2\right.$ = monophosphamide.—Gerhardt's biphosphamide.

Dr. Schiff* regards the substances $PS_4 Cl_5$, and $PS_2 O_4 Cl_5$, produced by the action

* *Annalen der Chemie und Pharmacie*, cii., 111.

of perchloride of phosphorus upon sulphur, sulphurous acid, and other inorganic acids, as mixtures of chloride of sulphur with chloride of sulpho-phosphoryl, and of oxychloride of phosphorus with chlorosulphurous acid, viz. with the chloride corresponding to the acid. The production of these substances would be represented by the equations

$$PCl_5 + 4\,S = PS_2\,Cl_3 + Cl_2\,S_2\text{; and}$$
$$PCl_5 + S_2\,O_2,\,O_2 = PO_2\,Cl_3 + S_2\,O_2,\,Cl_2\text{;}$$

analogous to the production of benzoyl chloride ($C_{14}\,H_5\,Cl\,O_2$) and oxychloride of phosphorus, by the reaction of pentachloride of phosphorus with benzoic acid. MM. Persoz and Bloch,* on the contrary, regard these substances as homogenous compounds of the chloride with the acids. The clear, highly refractive liquid, produced by the action of dry sulphurous acid upon pentachloride of phosphorus, is represented by them as sulphite of the pentachloride PCl_5, $S_2\,O_4$. But Dr. Schiff found that by repeated fractional distillation, it was separated into a liquid, boiling at 82° C., which presented only very slight phosphoric acid reaction, and another liquid, boiling at 110° C., which proved to be oxychloride of phosphorus. The former liquid is decomposed with water and alkalies, yielding sulphurous and hydrochloric acids. With alcohol it yields ethyl-sulphurous acid, and hydrochloric acid.

If sulphurous acid and its derivatives are regarded as compounds of a bibasic radical, $S_2\,O_2$, thionyl; the sulphites would be represented by the formula $S_2\,O_2$, H_2, O_4, sulphurous anhydride by $S_2\,O_2$, O_2, and the above-mentioned liquid as the chloride of this radical $S_2\,O_2$, Cl_2. When this substance is brought in contact with dry ammonia, violent reaction takes place, and a white crystalline substance is produced, from which water extracts chloride of ammonium. The remainder is gradually decomposed, and the solution contains sulphite of ammonia, together with chloride of ammonium. Alkalies produce immediate decomposition with evolution of ammonia, and acids liberate sulphurous acid. Hence this substance is probably thionamide, produced as follows:—

$$S_2\,O_2,\,Cl_2 + 4\,NH_3 = S_2\,O_2\,H_4\,N_2 + 2\,NH_4\,Cl.$$

With aniline, chloride of thionyl also yields a solid substance that is very readily decomposed, and probably has the same constitution.

The so-called anhydrous bisulphite of ammonia (Rosês sulfit ammon) would, according to this view, be thionylaminic acid, $S_2\,O_2$, $NH_2\,H$, O_2.

The action of pentachloride of phosphorus upon anhydrous sulphuric acid is quite analogous to the reaction with sulphurous acid. The substance represented by MM. Persoz and Bloch as bisulphate of the pentachloride, $PCl_5\,S_2\,O_6$, is therefore a mixture of oxychloride of phosphorus and chlorsulphuric acid, $S_2\,O_4\,Cl_2$. The same substances are produced by the action of the pentachloride upon hydrated sulphuric acid, together with a substance that is decomposed by water into sulphuric and hydrochloric acids. Prof. Williamson states† its composition to be $S_2\,O_6\,HCl$.

In sulphuric acid also there may be a radical, $S_2\,O_4$, sulphuryl, and the constitution of the derivates would be:

$S_2\,O_4,\,O_2$	Sulphuric anhydride, corresponding to	$H_2\,O_2$
$S_2\,O_4,\,H_2,\,O_2$	Hydrated sulphuric acid "	$\overbrace{H_2\,H_2},\,O_4$
$S_2\,O_4,\,Cl_2$	Chlorsulphuric acid (chlorsulphuryl)	$\overbrace{H_2\,H_2}$
$S_2\,O_4,\,Br_2$	Bromsulphuric acid‡ (bromsulphuryl)	
$\overbrace{S_2\,O_4,\,H_4\,N_2}$	Sulphamide, corresponding to	$N_2\,\overbrace{H_2\,H_2}\,H_2$
$\overbrace{S_2\,O_4,\,H\,NH_2},\,O_2$	Sulphamaminic acid (Rose's sulphatammon)	$\overbrace{NH_4\,H},\,O_2$

Concentrated nitric acid reacts violently with pentachloride of phosphorus, hydro-

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* *Comptes Rendus*, xxviii., 86 and 389.
† *Ann. der Chem. und Pharm.*, xcii. 342.
‡ Odling, *Jahresber. f.* 1854, p. 308.

chloric acid is disengaged, and a bluish red liquid, probably NO_4Cl, which gives yellowish-red vapour when distilled, PO_2Cl_3 distils over.

The reddish-brown liquid produced by the action of PCl_5 upon tungstic acid, yields PO_2Cl_3 when distilled, and there remains a brown substance, which sublimes as yellowish-red vapour, and is probably $W_2O_4Cl_2$.

Molybdic acid reacts with PCl_5 in the same manner as tungstic acid, but much more violently, producing a reddish oily liquid, which, when distilled, yields first oxychloride of phosphorus, then yellowish-white needles of chlormolybic acid, and then bichlormolybdic acid as a red woolly sublimate.

Antimonic acid reacts quite differently with PCl_5—hydrochloric acid is evolved together with oxychloride of phosphorus, and antimonic anhydride remains.

$$2\,SbH_3O_8 + 3\,PCl_5 = Sb_2O_{10} + 3\,PO_2Cl_5 + 6\,HCl.$$

Anhydrous antimonic acid is not affected when distilled with PCl_5.

With boracic acid and silica the same reaction takes place as with antimonic acid.

Anhydrous phosphoric acid heated with PCl_5 gives rise to a clear liquid, which is represented by Persoz and Bloch as $PCl_5 + PO_5$. Dr. Schiff finds that it is oxychloride of phosphorus with some perchloride. Its production may be represented by the equation

$$3\,PCl_5 + P_2O_{10} = 5\,PO_2Cl_3.$$

Chlorochromic acid $Cr_2O_4Cl_2$ produces with PCl_5 oxychloride of phosphorus and chloride of chrom; but there is a secondary action, giving rise to the production of a substance similar to that described by Casselmann* as resulting from the action of chloride of chromic acid and PO_2Cl_3.

Dry carbonic acid is not affected by PCl_5; bisulphide of carbon dissolves some PCl_5, which may be crystallized from the solution, but it does not react chemically Chlorchromic acid does not react with bisulphide of carbon.

Sulphuretted Organic Acids.—The compounds of organic radicals with metals are remarkable, from the fact that they are analogous in constitution to the inorganic compounds of the respective metals. Thus: antimony-ethyl, $Sb[C_4H_5]_3$, corresponds to SbH_3 and SbO_3; cacodyl, $As[C_4H_5]_2$, corresponds to AsH_2 and AsS_2; oxide of cacodyl, $As[C_4H_5]_2O$, to AsO_3; and cacodylic acid, $As[C_4H_5]_2O_3$, to AsO_5. This correspondence has been found to obtain between the compounds of phosphorus and selenium with organic radicals and the inorganic compounds of those metalloids. Thus: selenide of ethyl, $Se[C_4H_5]O$, corresponds to selenous acid, SeO_2; and phosphide of ethyl, $P[C_4H_5]_3$, to phosphorous acid, PO_3—the oxygen of these substances being replaced by ethyl. Mr. Hobson† has succeeded in obtaining a sulphur compound of the same kind, belonging to the thionic acid type, by the action of sulphurous acid upon zinc-ethyl. It is an oily volatile liquid of a pleasant but very acid taste, soluble in water and alcohol. Its composition is represented by the formula $HO, S_3[C_4H_5]O_5$, corresponding to HO, S_3O_6. He calls this substance ethyltrithionic acid.

The zinc salt, $ZnO, S_3[C_4H_5]O_5, HO$, crystallizes in small colourless needles, and retains its crystal water at 100° C. It has a peculiar smell; is soluble in hot alcohol, almost insoluble in cold; sparingly soluble in ether or water, hot or cold.—The baryta salt has the same constitution, but loses its crystal water at 100° C.—The silver salt is anhydrous, very soluble in water, crystallizable, and deliquescent. It is not decomposed by light, or at 100° C.

Ethyltrithionate of ethyl, $AeO, S_3[C_4H_5]O_5$, is a yellowish oil, denser than water, and of unpleasant odour. It is insoluble in water, but miscible with alcohol.

Sulphurous acid is rapidly absorbed by zinc-methyl, and a white crystalline substance produced, which is probably methyltrithionate of zinc.

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* *Ann. der Chem. u. Pharm.*, xcviii. 299.

† *Quarterly Journal of the Chemical Society.*

ON THE QUANTITY OF POISON WHICH HAS BEEN FOUND IN THE STOMACH IN MURDER BY POISONING WITH ARSENIC.

BY ROBERT CHRISTISON, M.D.,

Professor of Materia Medica in the University of Edinburgh.

Facts of little or no moment in physiology or medical practice, may become of great importance in the practice of medical jurisprudence. So it was on more occasions than one in course of the late trial of Madeleine Smith for the murder of Pierre Emile L'Angelier.

One of these facts related to the amount of arsenic which has been, or may be, found in the stomach, when it has been given secretly for the purpose of murder, and when the deceased had vomited repeatedly after taking it.

In the case of L'Angelier, Dr. Perry found 88 grains in the stomach, although the deceased survived from eight to ten hours after the probable period of taking the poison, and vomited repeatedly during that interval. In the prisoner's defence an attempt was made to show that so large a quantity of arsenic had never been found in the stomach in a case of murder effected by that substance; that the discovery of so large a quantity in the stomach—the deceased having vomited repeatedly—inferred the administration of a much larger quantity; and thus, that the quantity taken must have been larger than another party could have secretly administered, or naturally would attempt to administer.

The questions thus arising in the case having been started suddenly upon the medical witnesses, and, for the first time, I believe, in any court of justice, no one was prepared to answer them from ascertained facts; and the attempts made to answer them categorically, were failures. In my own examination I confined myself to the answer, that I had not myself met with any instance of murder by arsenic, in which so much as 88 grains had been found; that I could not recollect any published case in which so much, or anything approaching to so much, had been found; but that I would not rely on my recollection as to a negative fact; and that, in charges of murder by poisoning with arsenic, it is generally impossible to get information as to the actual quantity used. On my re-examination three days afterwards, an attempt was made by the counsel for the Crown to re-open this question, but this was held by the Court to be incompetent. I was better prepared then with the necessary information, than when the subject was suddenly put before me for the first time. But I was not even then so well prepared as I am now. For the purpose of the present brief communication is to state a case which annihilates the defence of the prisoner, so far as the large quantity of arsenic found in the stomach of the deceased may have been thought to support it.

Dr. Mackinlay of Paisley very lately reminded me of a case of poisoning with arsenic, in which we were both concerned, in 1842. A person came under a charge of poisoning with arsenic, and was indicted. But, on account of some informality, this indictment fell to the ground, and the trial was necessarily delayed. Meanwhile, during the delay, the general evidence was thought defective, and the trial was dropped. There could be no doubt, however, that murder had been committed. The arsenic was administered in whisky punch with sugar, the arsenic being kept in suspension by constant stirring. The person survived at least five, possibly seven hours, and frequently vomited a yellowish or greenish liquid. Nevertheless, I found a little spirit in the contents of the stomach; and I collected 30 grains of arsenic in substance from the stomach and its contents. Drs. Mackinlay and Wylie of Paisley, who examined the dead body, and also discovered arsenic in the stomach, had scraped off a quantity of the powder of this substance from the inside, upon a watch-glass. I was not made aware at the time how much had been thus obtained, but Dr. Mackinlay now informs me that the quantity was 60 grains.

Here then is a case exactly like that of Angelier. Ninety grains of arsenic, and this in substance, were found within the stomach alone. If to this be added, as in Dr. Perry's analysis in L'Angelier's case, the probable arsenic dissolved and suspended in the contents of the stomach, and that imbibed by the textures of the stomach itself, it is impossible to estimate the total quantity in the stomach at less than 100 grains. But there was also arsenic in the intestines, and, indeed, it had actually caused purging.

How large a quantity, then, must have been given in that instance! How

strangely easy is it for a determined and designing murderer to administer secretly those large quantities of a substance, whose weight should render it difficult to be mixed, and whose roughness should betray its presence when abundant! How difficult for the stomach to discharge it by vomiting!

I draw no conclusion as to the question of Madeleine Smith's innocence or guilt. In common with the public at large, I am well satisfied that she escaped condemnation. But, as I have been supplied, through the kindness of Dr. Mackinlay, with the means of completing a fact, closely touching a ground of defence, which, at the time it was brought forward, I regarded as hypothetical and baseless, and which may be made much of again, were it allowed to stand, as it has hitherto done, I have thought it my duty to make the true state of the question known.—*Edinburgh Medical Journal.*

POISONING BY PRUSSIC ACID.

At Croydon, a mother and her two sons, who had for some time past been living to all appearance in the greatest harmony together, were found dead in their beds on Thursday morning, December 10th. Mrs. Smithers possessed a little property of her own. William, the eldest son, who was a clerk in the Bank of England, had been unfortunate in his speculations on the Stock Exchange, and had lately become involved in pecuniary embarrassments, which the servant, who lived with the family, stated he had endeavoured to conceal from the knowledge of his mother. An inquest was held on Saturday, December 12th, at the Wheatsheaf, Thornton Common, Croydon, before W. Carter, Coroner. The first witness called was Elizabeth Morgan, who stated that deceased was a widow lady, and that her two sons resided with her. The elder, William, was thirty-one years of age, the younger, Charles, was eighteen. On Thursday morning, about half-past five, Mrs. Smithers knocked at her door, and asked her to get up, as she heard William get out of bed. That night the brothers slept in the same room. As soon as she had dressed herself, William called to her, and asked for a wine-glass, which she gave him; did not notice anything particular in his manner. As the young gentlemen did not come down to breakfast, witness knocked at the door for some time, but received no answer; she heard William snoring. Shortly afterwards she took up a note for William, and knocked at the door again, but receiving no answer she went in; the brothers were both in bed, and appeared as though they were dead; the younger, Charles, was foaming at the mouth. Witness then ran to the next house to call in a young woman, and both returned to the room, when they found both the young men dead; they then went to her mistress's room, and found her also apparently dead, in a half-sitting position, her head reclining against the bed-post. Mr. Bottomley, who was the first medical man who arrived, at once decided that all three were dead. Witness stated that William was a very excitable young man, and had drank to excess on the two days previous to his death. She also said, "I think William did not like to die alone. All the family seemed to live very happily together, and to love one another very much. I think William gave Charles and his mother the prussic acid out of affection for them."

George Bottomley, Surgeon, residing at Croydon, said he found an ounce phial on the bed labelled "Prussic Acid—Poison;" the phial was stoppered with the cork in it; also a wine-glass, which had been used. Had no doubt that it had contained prussic acid, but not of the strongest kind. Saw a letter on the bed, and took possession of it; went out of the back into the front room, and saw there Mrs. Smithers, who was dead; witness was of opinion that these persons had been dead half an hour before his arrival. Examined the bodies, and did not find any external injury on either of them; detected the smell of prussic acid, and had no doubt but that poison was the immediate cause of the death of the two brothers, but in the case of Mrs. Smithers the smell of prussic acid was not detected. The heart of a person dying from the effects of prussic acid might sometimes beat after life was gone for probably ten or fifteen seconds, but no noise like that of snoring, as deposed to by the first witness, could have occurred. Witness found on the shelf in the room a bottle labelled "Prussic Acid, Scheele's Strength;" it had a glass stopper, and had very recently contained the acid; there was no label indicating where it might have been purchased, but bore the name of the makers.

The *Coroner* observed, that as the medical evidence was not satisfactory as to the

cause of the death of Mrs. Smithers, it would be necessary to adjourn the inquiry, that a *post mortem* examination of the body might be made.

The inquiry was accordingly adjourned till Tuesday, December 15th, when the following verdict was returned:—"That Mary Smithers and Charles Smithers were wilfully murdered by the administration of poison by William Holter Smithers, and that William Holter Smithers afterwards committed self-destruction while suffering under temporary mental derangement."

CASE OF SUSPECTED POISONING.

An adjourned inquest was held on Thursday, Dec. 3, by Mr. Myers, Coroner, in the Town Hall at Preston, on the body of Mr. Edward Turner, reedmaker, of that town, who died after an illness of twelve days, during which he was attended by Mr. Monk, surgeon. He was buried on a Sunday, having died the previous Friday; but circumstances of a suspicious nature having been talked about in connexion with his illness, the body was exhumed for inspection, and the contents of his stomach forwarded to Professor Taylor for chemical analysis.

The evidence of Alice Chadwick, housekeeper to the deceased, showed that originally his disease was regarded as a bowel complaint, and Mr. Monk sent him pills and other medicine continually. The deceased complained of the medicine making him sick, and said he would have no more of it. Mr. Monk gave her orders not to let any one see the deceased, or disturb him in any way. The deceased, who had no family, and who was a widower, living alone with his housekeeper, died in her presence early on the Friday. Mr. Monk called an hour afterwards (at seven o'clock in the morning), and on being told by her that her master was dead, immediately desired her to give him the keys, and said he would lock the shop up. He arranged for the funeral to take place on the Sunday. He opened the deceased's desk, and took out the money—£5 10*s.*—which was there, and on the Monday ransacked the house, packed up all the books, and removed them to his own house. On the Tuesday he showed her a will, purporting to be made by deceased in his favour. On the same day he sold the goods, and let the shop to a Mr. Wilkinson. There was a legacy of 3*s.* a week to the housekeeper, as Mr. Monk told her. She stated further that the corpse turned red a few hours after death.

The inquiry has excited great interest, and Mr. W. Blackhurst appeared as attorney for Mr. Monk, who is a person of good position in the town, an alderman, a county and borough magistrate, and who not long ago filled the office of mayor. The inquest was again adjourned to the 11th instant, to obtain Professor Taylor's report, the prescriptions given by Mr. Monk were produced, and pronounced suitable to the deceased's bowel complaint by three medical men. There were no appearances of poison in the body at the *post mortem* examination. Dr. Taylor's analysis stated that only a few small portions of mercury were discovered, which might have been medically prescribed. The jury immediately returned a verdict of "Death from natural causes."

Mr. Monk is now in Preston House of Correction, awaiting his trial at the next spring assizes for the alleged forgery of the will of deceased.

POISONING BY OXALIC ACID.

A single woman, twenty-five years old, named Maria Lewis, lodging at No. 4, Union Street, Commercial Road East, went up to her room, with her little girl, three years old, for the purpose, as was supposed, of lying down to rest. A few hours afterwards, a woman living in the same house went into the room, and found her lying dead, with the little girl by her side, suffering great pain and sickness. Two small teacups, both of which had contained, and one was still partly full of, oxalic acid, were found on the table. An antidote was administered to the child, and she gave the following account:—"Mother took some of the stuff, and then gave me a little; but I was sick, and did not swallow it." She added, "It was so acid I could not take much." The room was examined, and several letters were found which had been written by the deceased shortly before the fatal act was committed. The principal one was addressed to her sister, with whom she lodged, which contained the following postscript:—"I have taken the child's life as well as my own, so that she should not be any trouble to any of you." The deceased had been for some time in a desponding frame of mind, owing to family differences. The jury returned a verdict of Temporary Insanity. The child is now out of danger.

SINGULAR CASE OF POISONING BY PRUSSIC ACID.

On Monday evening, Dec. 7, an inquest was held at Monkwearmouth on the body of a child aged one year and eight months, the son of Mr. James Smith, Surgeon. The surgery door had been left open, and the child, unknown to the family (Mr. Smith being out professionally), had entered the room, and succeeded in climbing up to a small closet, where there were a number of bottles containing various drugs. His eye doubtless was attracted by a coloured bottle which contained prussic acid, and from which he had evidently drank a few drops, for upon Mr. Smith coming in shortly afterwards, and going to the surgery, he found his child lying on the floor, with the bottle close beside him. Brandy and other remedies were immediately administered by Mr. Smith, and by Mr. Davies who was sent for to his assistance, but without avail, as the child died soon after the arrival of Mr. Davies. The jury returned a verdict of "Accidental Death," and added a caution* to persons having poisons in their houses to keep them under lock and key.—*Morning Post*, Dec. 11th.

[* A very proper caution, but was no blame attached to the mother or nurse who had the care of the child? Or were there no such persons, but had poor Mr. Smith the conflicting and harassing duties to perform, as protector to his children and practitioner to his patients? For to one or other of these conclusions the evidence leads us.]

POISONING BY BICHROMATE OF POTASH.

An inquest was held on Thursday, Dec. 3rd, at the Elephant and Castle, Camden Town, touching the death of Charles Thomas Redford, aged three years. On the Friday previous, the deceased, during the absence of Mr. Brotherton, a veterinary surgeon, got into his room and extracted from a flat jar some white lumber, which the poor child no doubt supposed was candy, or something of that kind; it was, however, bichromate of potash. On the child being discovered in the room by the mother, he was eating the poisonous ingredient, but she was not aware it was such, as the bottle was not labelled with the word poison. Some hours afterwards the child was taken ill, and Mr. Wade, a surgeon, was sent for, who adopted the most active measures, but inflammation and mortification came on, which terminated fatally on Monday. The jury regretted the jar was not labelled "Poison," as then the mother would have called in advice sooner. Verdict—Accidental Death.

POISONING BY SULPHURIC ACID.

The following case is briefly described by Dr. Winn, in the *Lancet*, Dec. 5th:—The patient was a child four years of age, and had swallowed a quantity of sulphuric acid by accident. Difficulty of breathing and pain, followed by cough, dark tongue, fever, and glossitis supervened. A grain of calomel was given every hour, and a blister applied. The next day the calomel was omitted and the blister dressed with mercurial ointment. The child recovered.

CHARGE OF ATTEMPTED WIFE POISONING.

John Guy, a master carter, was tried at Liverpool, for having attempted to poison his wife by arsenic.

The evidence given before the magistrate on which he was committed for trial, went to show that the prisoner and his wife lived unhappily together in consequence of his depraved and disgusting intimacy with another woman. On Sunday, the 22nd November, the prisoner and his wife had a quarrel, and the latter went down stairs, leaving her husband in bed. Shortly after, she sent her little girl into the room, who observed her step-father with a bottle in his hand. The following morning Mrs. Guy took a dose of some medicine she had procured for palpitation of the heart, but immediately perceived it had a "sandy" taste on the tongue, and very shortly after a "burning," "tickling" sensation in the throat and swallow. She took a great quantity of hot coffee, soon vomited, but at this time did not suspect poison. A policeman came soon after to speak to her on some other matter, and the little girl said to him, "My mother has been sick all morning, since she took her bottle, and I saw my father put some stuff like flour into it, when I went into his bedroom yesterday."

The same morning the little girl told a carter, living in the house, the same story in nearly the same words. The woman was put under medical treatment and soon recovered. Dr. Edwards analysed the medicine, the remains of a dose left in a teacup, and the second and subsequent vomits, (the first vomiting having been thrown away). He deposed to having found 114 grs. of white arsenic in the bottle of medicine, 12 grs. remaining in the teacup from which the dose had been taken, and between 4 and 5 grs. in the vomited matter. Sufficient had been swallowed to have destroyed life if it had not been rejected from the stomach. The arsenic had not been coloured in accordance with the Act of Parliament.

Before the magistrates the little girl refused to repeat the evidence criminating her step-father, but stated that "all she had told the officer was true." At the trial, however, she flatly contradicted her former statement, and declared she had never seen her step-father touch the bottle; the prosecution, therefore, fell to the ground for want of evidence.

SUICIDE BY OIL OF VITRIOL.

An inquest has been held at the Lord Wellington Tavern, University Street, Tottenham Court Road, before Mr. Wakley, coroner, on the body of Mrs. Jane Ashley, aged 38, who committed suicide by taking oil of vitriol. The evidence of the husband of the deceased went to prove that in consequence of the death of her infant, about three weeks ago, she had given way to excessive grief, which he was unable to alleviate. A neighbour, named O'Brien, who lived in the same house, stated that on the day on which deceased took the poison, she came into his room, and said to his wife, "Good-by, Mrs. O'Brien, I have lost my dear child, and I am going to join her in the grave." At the same time, the poor woman, before witness could prevent her, drank the poison out of a cup. Deceased was conveyed to University Hospital, but she never rallied. A verdict of Insanity was returned.

DEATH OF AN INFANT FROM OVER-FEEDING.

The Borough Coroner (Brighton) held an inquest on Thursday evening on the body of the infant daughter of Mrs. Burgess, 108, Glo'ster Lane. The child, who was three months old, had been poorly with a cold for several days, and on Wednesday displayed some alarming symptoms, which induced the father to go for Mr. Tuke, Surgeon, but being in a confused state he gave the wrong address, and Mr. Tuke went wandering about in vain in North Lane. Finding the Surgeon did not come, Burgess went for Mr. Verrall, but before he arrived the child was dead. Mr. Verrall ascertained, that in addition to the breast, three cups of arrowroot and some milk and water had been given to the child, and he attributed death to the fact of the stomach being unable to relieve itself from this mass. Verdict, "Died of natural causes."

LONDON MILK.

We have received a communication from M. A. B., directing attention to a letter in the *Medical Times and Gazette*, of Nov. 28, p. 570, on the bad quality of London milk, arising not merely from the usual dilution and adulteration, but also from the unhealthy condition of the cows when kept in crowded and badly ventilated cow-houses in London, without exercise in the open air, or the requisite supply of fresh food. As a partial remedy for the existing evil, the appointment of inspectors is recommended; but the effectual remedy would be the removal of the cows to the salubrious air of the country—a practice which is becoming more prevalent every year, as the facilities of conveyance by railway increase. Our correspondent is an active promoter of a "Ladies' Association for the Diffusion of Sanitary Knowledge, and Promotion of Physical Education," the offices of which are at 17, Egremont Place, Brighton, and 15a, Old Cavendish Street, London. The object of the Association is to diffuse information on all subjects relating to the preservation of health, and more especially the feeding and rearing of children. It is proposed to establish classes for training nurses, and courses of theoretical and practical instruction will be given by competent medical professors. The undertaking is at present in its infancy. The intention is laudable, and the subject important.

FRAUDULENT IMITATION OF LABELS.

FARINA *v.* SILVERLOCK.

Sir F. Kelly, Mr. Daniel (of the Chancery bar), Mr. E. James, and Mr. Quain, were counsel for the plaintiff; Sir F. Thesiger, Mr. Temple, Mr. Lush, Mr. Unthank, and Mr. Buxton (of the Chancery bar), appeared for the defendant.

The declaration alleged that the plaintiff is the celebrated manufacturer of Eau de Cologne; that he was in the habit of affixing to his bottles a particular kind of label, which constituted his trade mark; and that the defendant, the printer in Doctors' Commons, had printed and sold copies of his labels.

The defendant pleaded "Not Guilty," and that the labels did not constitute a trade mark of the plaintiff.

Sir F. Kelly stated that the ancestor of the plaintiff went to Cologne in the year 1709, and established himself as a dealer in Italian articles. Some time after he invented the secret of the perfume. The business had since continued in the family, and the secret was handed down from father to son for generations, and was known only to one or two members of the family at a time. The secret was communicated to the plaintiff in 1835, and he became a partner in the firm in 1841. The label which the defendant was charged with imitating had been adopted by the firm in 1832. Since then, spurious Eau de Cologne had been sold with labels so closely resembling the plaintiff's, as to deceive the public. Since 1846 he had established his right in no less than eleven cases. On the plaintiff's label was the name "Johann Maria Farina," and under it, "*Gegen uber dem Julichs Platz*," with a flourish underneath; in the corner was a shield with the Prussian eagle and a flowerpot; round the seal the inscription "*Gegen*," &c., was again repeated, with the plaintiff's initials and "an eye" in the centre. On the labels printed by the defendant the name and inscription were the same. There was a slight difference in the flourish and some strokes and dots by which it was ornamented. There was also a slight difference in the shield in the corner and in the seal. The plaintiff applied to the Court of Chancery to restrain the defendant. Vice-Chancellor Wood granted an injunction, but it was afterwards dissolved by the Lord Chancellor, who suspended the bill until the plaintiff should bring this action. The Lord Chancellor, in the course of his judgment, said, it was clear, that a person who had adopted a particular mark to designate his manufactures, had a right to prevent any person from selling any article marked in such a way as to make the public believe that it was his. There was, however, another view of the case which did not appear to be present to the Vice-Chancellor's mind, that a trader who had some of the genuine Eau de Cologne of the plaintiff, but had not any of his labels, might get a printer to print some for him, and he could not be punished, as the plaintiff had no copyright in it. With all respect for the Lord Chancellor, he (Sir F. Kelly) should contest that doctrine; the defendant had no right to sell these labels, and if his intention was such as he alleged, he would have made an exact copy of the plaintiff's, and not a colourable imitation. The Lord Chancellor held that if the labels printed by the defendant were sold to persons, who might apply them to lawful purposes, there was no ground of complaint, if he sold them to persons without further inquiry. He (Sir F. Kelly) would show that the pretence of the defendant was mere moonshine, and that there never was an instance in the last twenty-five years of a single label being lost or worn out, except once, about ten years ago, when a quantity coming to London were damaged on board ship.

Mr. J. M. Farina, the plaintiff, was then called. He stated that the label now used had been designed by his father. He sold about half a million bottles in the year, and never sold any except in bottles. The labels were printed at Cologne, and he had never given permission to have them printed elsewhere. He never supplied the labels separately to any person except in the one case mentioned.

Cross-examined.—There are about thirty firms of the name of Farina carrying on business in Cologne; about twenty-one use the name Johann Maria Farina. There is a Mr. Aldenbruch carries on business in Julich's Plat, under the name Johann Maria Farina. Before 1832 his house used no labels at all, nor did any other house. They sent about 200,000 bottles a year to England. They used five different kinds of bottles. The label used by M. Aldenbruch had a resemblance to his.

To *Sir F. Kelly.*—There are only two persons besides himself named Farina in business at Cologne; one is a relative of his.

M. Langelman had been agent to the plaintiff for some years. He knew there was a secret in the manufacture. The words "*Gegen uber*," &c., on the labels were the only means of ascertaining the genuine articles. They become known as the trade mark. On one occasion he found a Mr. Shaw had printed these labels, and proceedings were taken against him. Proceedings were taken in several other cases against persons using imitation labels on a spurious article.

Evidence was given that no bottle was ever sent out by the plaintiff without a label, and that it formed the distinguishing mark; and that in no instance had the labels come off so as to render it necessary for any dealer to apply to a printer to supply them.

Several *chemists and perfumers were called on to prove that they were in the habit of manufacturing Eau de Cologne and selling it with Farina labels obtained from the defendant.*

Sir F. Thesiger then proceeded to address the jury for the defendant, but had not concluded his address when the Court rose.

Saturday, December 12.

Sir F. Thesiger proceeded to address the jury for the defendant. He contended that this was a very harsh proceeding against Mr. Silverlock, who had sold these labels without question for over thirty years. The plaintiff had sworn that his label was invented in 1832, but long before that labels exactly similar to those printed by the defendant had been used by the other person named Farina established at Cologne. In that year the plaintiff adopted his label, which only differed from that formerly in use in the position of some strokes and dots about the flourish. He (Sir F. Thesiger) admitted that, if the use of a label had been first introduced by plaintiff in 1832 as a trade mark, it could not be denied that the defendant's was a colourable imitation, but, so far from that being the case, he would show that the original blocks of the defendant's labels had been purchased from a Mrs. Cox, the widow of Mr. Cox, a printer, who had used them for fifty years, and it was important to remember that there was no proof of the defendant's having ever sold any exact fac-similes of the plaintiff's labels. He admitted that a person who had established a right to a particular trade mark, was entitled to maintain an action against any person vending a spurious article under his mark, and also against a printer who printed labels for that purpose, but to maintain an action against the printer it was essential to show that he had printed and sold them with a fraudulent intention.

Lord Campbell apprehended that the defence was that the defendant had printed these particular labels before the plaintiff had established his trade mark, and had since sold no other.

Sir F. Thesiger said that was his case; *he did not intend to defend the fraud of those parties who had very glibly stated that they had sold their own manufacture under these labels, but the defendant had nothing to do with their conduct. He had no intention that these labels should be used dishonestly.*

Lord Campbell supposed Mr. Silverlock had no wish to continue the proceeding complained of.

Sir F. Thesiger said, he had not printed a single one since the proceedings commenced, but he was forced to come and defend himself against the charge of fraud. From 1832 to 1857 he had only printed 6725 of the three kinds of Farina labels, and the profit from 1832 to 1857 was not 40*s*. Under such circumstances, of course it would not have been worth the defendant's while to defend these proceedings, but he was anxious to defend himself from the charges made against him.

Mr. Henry Silverlock, the defendant, stated that he had been in business since 1828, and in that year he bought a quantity of these labels from a Mrs. Cox, whose husband had been in business for many years; he continued to buy the labels up to 1846, when he purchased the blocks from Mrs. Cox's representatives, with her stock in trade. He had never printed any other kind of these labels. He first learned in 1833 that there were a number of Farinas in Cologne. The plaintiff appears in the *Cologne Directory* of that year, but he had no idea that he claimed the label as a trade mark. His first intimation was the notice of action in 1855. He went to Cologne in 1853, on the occasion of Mr. Benfield being threatened with proceedings by a Johann Maria Farina, 31, New Market. He called on that person; and afterwards, walking about, he saw the names of a vast number of Farinas. Until the bill

was filed, he had no idea that any person claimed the label printed by him as a trade mark.

Cross-examined.—He had sold small quantities of labels which could only be intended to replace originals that had been lost; that did not make him think the label was a trade mark. He could not swear that there was a single entry in his book of any Eau de Cologne labels before 1832. He did not know until lately that Shaw had been proceeded against. He had not printed any for four or five years.

Some witnesses were then called to prove that labels similar to those of defendant's had been printed and sold by Mrs. Cox and others for many years.

Mr. Orridge stated that he had more than once purchased labels from the defendant to replace those of the plaintiff which had been damaged or dirtied.

Sir F. Thesiger and *Mr. E. James* addressed the jury on behalf of their respective clients.

Lord Campbell said, it seemed to him that the plaintiff had made out a very strong case; it was for the jury to consider whether a sufficient answer had been given to it; but he could not see how the right to a trade mark could be established unless the plaintiff had established his in this case. The question was, whether the defendant had done anything to subject himself to an action for the use of it. He had for a number of years engraved and sold to dealers a number of labels so closely resembling the genuine ones as to be a colourable imitation; the attempt was a very futile one which had been made to show that he had sold these labels under the belief that they were to be used only for the purpose of replacing genuine ones which had fallen off. He (Lord Campbell) considered there was evidence for them that Mr. Silverlock knew this was a trade mark, and that he sold them without the consent of the owner; if so the owner had a remedy, not only against the person using them, but also against the printer. The answer, however, set up to the action was a very serious one, and he was of opinion, in point of law, that if the trade mark published by the defendant was known before 1832, and sold and circulated in this country, and the defendant had only engraved that which was before in circulation, and had no notice that it was the trade mark of the plaintiff, Johann Maria Farina, the action was not maintainable, and if so the defendant was guilty not only of no moral fraud, but not even of legal fraud. It was for the jury to consider whether the answer of the defendant was made out to their satisfaction.

The jury then retired, and after a short absence, returned a verdict for the plaintiff—Damages, 40*s*.

ROYAL INSTITUTION OF GREAT BRITAIN,

Albemarle Street.

December 1857.—The Weekly Evening Meetings of the Members of the Royal Institution will commence for the Season on Friday, the 22nd of January, 1858, at half-past eight o'clock ; and will be continued on each succeeding Friday evening, at the same hour, till further notice.

The following are the arrangements for the lectures before Easter:—

Six Lectures "On Static Electricity (adapted to a juvenile auditory)—by Michael Faraday, Esq., D.C.L. F.R.S. &c., Fullerian Professor of Chemistry, R.I. December 29th and 31st, 1857, and January 2nd, 5th, 7th, and 9th, 1858, at three o'clock.

Twelve Lectures "On the Principles of Biology," by Thomas Henry Huxley, Esq. F.R.S., Fullerian Professor of Physiology, R.I. To commence on Tuesday, January 19th, 1858, at three o'clock; to be continued on each succeeding Tuesday, at the same hour, till Tuesday, March 23rd. N.B. Lectures IX. and XI. will be delivered on March 15th and 22nd.

Ten Lectures "On Heat, considered as a Mode of Motion," by John Tyndall, Esq., F.R.S., Professor of Natural Philosophy, R.I. To commence on Thursday, January 21st, 1858, at three o'clock; and to be continued on each succeeding Thursday, at the same hour, till Thursday, March 25th.

Ten Lectures "On the Chemistry of the Elements which Circulate in Nature," by Charles L. Bloxam, Esq., Professor of Practical Chemistry at King's College, London. To commence on Saturday, January 23rd, 1858, at three o'clock; and to be continued on each succeeding Saturday, at the same hour, till Saturday, March 27th.

ROYAL POLYTECHNIC INSTITUTION.

This institution, under the management of Mr. Pepper, continues to afford a variety of instructive entertainments, tending to awaken a general interest in elementary science, and to combine instruction with recreation. On Wednesday, Dec. 23rd, some novel and interesting exhibitions were presented to the public, and among other practical subjects, that of Bread Making was introduced, and a sack of flour was made into bread by Mr. Stevens and his staff, while Mr. Pepper was delivering a lecture on the process, and explaining the patent machine introduced by Mr. Stevens, for kneading the dough by mechanical means, instead of bringing it into close contact with the hands and arms of the manipulators, as is usually done. The machine is to be had in sizes to make from one peck to two sacks of flour.

While on the subject of bread-making, we ought not to omit a notice of a recently patented process by Dr. Dauglish. The following is extracted from an article in the *Spectator*, also quoted in the *Times*, on

AERATED BREAD.

"Hitherto all the improvements proposed in bread-making have either taken for granted the necessity of fermentation, or sought to replace it by some chemical process, of which the harmlessness was, to say the least, exceedingly questionable. Dr. Dauglish goes more effectively to work, and, by a simple enough adaptation of processes familiar for other uses, dispenses with all recourse either to the brewer or the chemist, and undertakes to produce bread of a quality superior to any that is made, without any other ingredients than flour, water, and salt. There are few articles of consumption that have seemingly less analogy than bread and soda-water, or other effervescing liquors; but Dr. Dauglish's patent is pretty much the same step in the process of bread-making that was gained by using a machine to charge liquids with carbonic acid gas. The flour is placed in a strong iron vessel, somewhat similar to a Papin's digester, and moistened with aerated water from an adjacent condenser. Then, for the brief period of eight minutes, the dough is kneaded by machinery inside the vessel. The vessel is then opened, and the gas contained in the water with which the flour has been mixed, liberating itself when the pressure is withdrawn, instantaneously expands the flour into five or six times its previous bulk; and behold, the rising of the dough, so tedious and laborious by the old methods, is completed! The process is undeniably a rapid one. Its other advantages are set forth by the patentees as follows:—

"'1. There is a saving of the whole of the waste caused by fermentation, which averages fully ten per cent. Thus ten per cent. more bread is made out of a sack of flour than by the old process. 2. The process, instead of occupying eight or ten hours, is completed in half an hour. 3. The cost of machinery and gas is less than that of yeast used in the old process. 4. The dough requires scarcely any handling to form it into loaves. 5. The bread is absolutely pure; it is simply flour, water, and salt. Finally, should the whole of the bread in the kingdom be thus made, a saving would be effected of an amount equal to our entire importation of foreign wheat.'"

ALARM OF FIRE AT 17, BLOOMSBURY SQUARE.

On Thursday, the 10th of December, an accident occurred in one of the laboratories of the Pharmaceutical Society, which for some minutes threatened the destruction of the premises by fire. The number of students in the laboratory being unusually large, every available working place had been put into requisition, and a part of the upper laboratory, not usually used for that purpose, was occupied on the above day by some pupils who had just entered. Several Winchester quart bottles of spirit of wine had been kept on a shelf in that part of the laboratory, and these had not yet been removed, while the gas pipe which ran behind one of the bottles, allowed an escape of gas, which, becoming ignited, caused the bottle to break, and the contents were instantly ignited. It happened that a Committee of the Council was just breaking up at the moment, the members of which rendered prompt assistance; and although for some minutes the heat was so great that it

was impossible to breathe in the room, yet by keeping the door and windows closed as much as possible, and throwing in a few pailfuls of water, the combustion was confined to the room and its contents, and the damage done, which was estimated at about £20, consisted of the destruction of some shelves, apparatus, bottles, books, gas fitting, &c.

BOOKS RECEIVED.

PROSTITUTION, CONSIDERED IN ITS MORAL, SOCIAL, AND SANITARY ASPECTS, IN LONDON AND OTHER LARGE CITIES; *with Proposals for its Mitigation and Prevention of its attendant Evils.* By WILLIAM ACTON, M.R.C.S., &c. London: John Churchill, New Burlington Street. 8vo. pp. 189. 1857.

INTRODUCTORY LECTURE TO A COURSE OF GENERAL PATHOLOGY, *delivered at the Grosvenor Place School of Medicine.* By JOHN COCKLE, M.D., &c. London: T. Richards, Great Queen Street. 1857.

TO CORRESPONDENTS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—The question put by Mr. Barber at the last meeting of the Liverpool Chemists' Association will no doubt appear in your columns. This being the case, I know you will, in justice to me, insert this answer. Until I saw the proceedings of the Society above referred to, I had not the slightest idea of the omission of the E. after the F.R.S. on my note paper. If I add the letters at all to my name, I invariably sign them as Muspratt, F.R.S.E., &c. &c. The paper was *stamped* in Glasgow four years back, and hence I suppose arose the error which has been food for comment. Some years ago I ambitioned the Ph.D. and the F.R.S., but now-a-days these titles are so readily obtained, that I regard them no longer as distinctions of talent. "The mind is the standard of the man," and ever will be; and to those possessing the Ph.D. or the F.R.S. at the present time, who are not entitled to it, can well be applied the line of my friend, Sheridan Knowles, "Rank that excels its wearer, doth degrade."

I remain, yours respectfully,

JAMES MUSPRATT, F.R.S.E., &c.,
Professor of Chemistry.

College of Chemistry, Dec. 22nd, 1857.

[If we may judge from the above letter, we should say the letters F.R.S. denote Folly Remarkably Stupid, but we publish it "in justice" to the author.—ED.]

Liquor Potassæ Arsenitis.—Mr. Bamber has sent us a communication on this subject in which he refers to a statement made by Dr. Garrod and Mr. Redwood, as reported in the *Pharmaceutical Journal* for May, 1857, to the effect that the Liquor Potassæ Arsenitis of the Pharmacopœia is a solution of arsenious acid in carbonate of potash, which statement, he says, does not accord with the results of experiments he has made for the purpose of testing its accuracy. The experiments described, however, are insufficient to determine the question, and their publication in that form would answer no purpose. Arsenious acid can, no doubt, be made to expel carbonic acid from carbonate of potash, but the solution made according to the process of the Pharmacopœia for *Liquor Potassæ Arsenitis* is nevertheless a solution of arsenious acid in carbonate of potash.

T. P. (York) sends the copy of a prescription as follows:—

℞ Mist. Salin. eff. (c. Acid. Citric. et Ammon. Carb.)
Tinct. Ferri Mur.
Ether. Chlorici. ♏xv. sing. dos.

In preparing the medicine from this prescription, he says, he made an alkaline mixture containing carbonate of Ammonia in solution, and an acid mixture containing citric acid, the tincture of iron, and chloric æther, with directions to mix the two solutions, and take it during effervescence. He says the medicine was returned with a message that the prescription was incorrectly prepared; that it had been made up twice before, when the alkaline mixture contained the iron. He asks, was his mode of preparing the medicine correct? We think it was.

Enquirer (Yeovil) should communicate his name to the Secretary, who could satisfactorily explain the case referred to.

A Member (Clifton) wishes to be informed of the "incident which led to the discovery of Otto of Roses." We are not aware of any such incident, but presume it was discovered in the same way as other essential oils.

A Member (Halifax) sends a recipe for making superior Black Ink, which, he says, was hawked about in his locality by an itinerant Yankee. The recipe is that of Professor Runge, which is published in vol. xii. of this Journal, page 71, under the head of Runge's Writing Fluid.

Excelsior.—See papers on the volatile organic bases derived from coal tar, by Dr. Anderson and Mr. G. C. Williams, in the *Transactions of the Royal Society* for 1855 and 1856.

G. W. (Bristol).—The addition of a small quantity of a solution of creosote in spirit, will prevent ink from becoming mouldy. A formula for ink, which is not liable to this change, will be found at page 125 of our present volume.

O. L.—Ammoniated Solution of Quinine, vol. xiii., page 344.

A Member (Strand).—A member of the Pharmaceutical Society would not forfeit his membership on obtaining a diploma of the Royal College of Surgeons, but if he were to practise under such diploma, his privileges as a member would cease, and his name would not appear on the register as long as he continued so to practise.

C. H.—The tincture press alluded to may be obtained in Paris.

C. (London).—1. Christison or Taylor on Poisons. 2. In preparing the prescription alluded to, the lotion should not be filtered.

J. H. (Peterborough), *An Old Subscriber* (London).—The labels are liable to stamp duty, as containing a recommendation for the cure or relief of some disorder.

J. P. (Walmer).—The "Chemist's Dream" is scarcely adapted for our pages.

W. P. (Nailsea).—See page 48 of our July number.

J. L. R. (Longton) should have sent a copy of the newspaper in which the advertisement appears, to authenticate his statement, which is otherwise scarcely intelligible.

A Dispenser (Kennington) has directed our attention to the following notice in the Military Intelligence of the *Times*, Dec. 14th:—"Major S. G. Bunbury, commanding the depôt of the Medical Staff Corps at Chatham, has received orders to hold in readiness a detachment of 30 orderlies and assistant stewards of that corps to embark for Calcutta on the 20th inst., for the purpose of being employed as assistant dispensers in the military hospitals of India." We understand the term assistant dispensers in the above notice to apply to a class of persons in the capacity of porters or assistant stewards, and not dispensers of prescriptions. This view of the case is supported by the recent appointments of Dispensers for service in India, who were required to produce certificates of examination.

The Taraxacum and Morphia Controversy.—At the moment of going to press we have received two communications on this subject, but our space only admits of acknowledging them, with a very brief quotation. The object of one article is to point out the injustice and injury which might have been inflicted on the Chemist who prepared the medicine by the hasty announcement of the suspected presence of morphia. The other (alluding to Dr. Letheby's letter in the *Medical Times* of Nov. 28th) contains this remark:—"To talk of correcting the analysis of a stomach by the analysis of a mixture is absurd! Had the medicine not been found in this case, or had the whole been taken by the deceased—had the husband had an interest in the death of his wife, or a *liaison* with another woman—he might have been hanged upon this bungle."

Instructions from Members and Associates, respecting the transmission of the Journal, to the Secretary, 17, Bloomsbury Square, before the 20th of the month.

Advertisements (not later than the 23rd) to Mr. CHURCHILL, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XVII.—No. VIII.—FEBRUARY 1st, 1858.

PHARMACY IN SCOTLAND.

While the Pharmacy Bill was under discussion in the House of Commons, our brethren north of the Tweed were tenacious of securing the recognition of their right to participate in the executive responsibility, as well as in the privileges of the Pharmaceutical Society. The Members for Edinburgh, Glasgow, and some other Scotch boroughs, were instructed to oppose the measure unless the desired concessions were made; and a section providing for a Board of Examiners, to meet in Edinburgh, Glasgow, or such other place or places as the Council might think desirable, was especially insisted on. This proposition was received as a favourable and satisfactory indication of a disposition to co-operate in carrying out the intentions of the Act, and the ninth section was accordingly inserted in the terms desired. A Board of Examiners was appointed to sit in Edinburgh; and the requisite accommodation for conducting the examinations having been provided, the Board has met at intervals whenever a demand for its services was found to exist.

The number of Candidates, however, has been very limited. On the occasion of the recent examination last month, after an interval of nine months, only three presented themselves, namely, two for the major examination and one for the minor, besides two apprentices. Several others had communicated with the Secretary, apparently with the intention of coming forward, but ultimately either declined or deferred their examination until a future opportunity. After the very commendable zeal and emulation evinced by the representatives of the Society in Scotland, on the subject of maintaining the prerogative of examination in that portion of the kingdom, we certainly anticipated a more striking display of professional ambition on the part of the young men from whose ranks we hope to see the Society reinforced. It cannot be supposed that the hesitation to come forward arises from any dread of the ordeal to be passed through, for if we may judge from the attainments of several Candidates who, having received their early education in Scotland and afterwards removed South, passed their examination in London, we should not expect any deficiency. In the cases to which we refer, the young men, by their own industry and studious habits, with little if any advantages in scientific instruction, gave evidence of the possession of a sound practical knowledge of their business. The national temperament is favourable to the quiet studious habits from which a proficiency in pharmacy and the allied sciences may be expected. Scotland supplies the entire kingdom with gardeners of the first class, and this congenital faculty for the study of botany extended to materia medica, and supplemented by a practical acquaintance with chemistry, would form the groundwork of a complete pharmaceutical qualification. While some of the students to whom we have referred derived their preliminary education in small towns in Scotland, remote from any scientific school, and nevertheless passed the examination very creditably, the young men in Edinburgh, Glasgow, and Aberdeen, enjoy peculiar advantages, and can plead no excuse for their backwardness in filling up the ranks of the Pharmaceutical Chemists.

But we are informed that the fee for admission to the Pharmaceutical Society under the existing bye-laws is an obstacle;—that a considerable number of young men, and some Chemists already in business on their own account, would

be glad to be admitted as Annual Subscribers of one guinea; but the fee of ten guineas for registration as a Pharmaceutical Chemist, with five guineas in addition for life membership, is the obstacle in many cases. The commutation of the annual subscription for life membership became necessary as soon as the certificate or diploma of the Society represented a positive qualification attested by the Board of Examiners. While the Society was in its infancy, and the privileges of membership were granted by courtesy—that is to say, as a temporary arrangement to Chemists who were in business prior to a certain date without examination—there could be no semblance of injustice or inconsistency in making these privileges contingent upon the payment of an annual subscription. The defaulter could have no cause to complain of the omission of his name from the register when he ceased to comply with the only conditions on which he had been originally admitted; but in the case of a Member admitted on passing an examination, and afterwards becoming a pecuniary defaulter, although it was equally just that he should comply with the terms of the bye-laws, yet it might seem inconsistent to deprive a man of his professional status—which he had earned by examination, and enjoyed probably for a series of years—because he had omitted to pay his annual subscription of a guinea. It would be equally subversive of the stability of a Society to retain Members, and allow them to enjoy all their privileges as such, without enforcing the payment fixed by the bye-laws and necessary for the maintenance of the Institution. To obviate this dilemma, the annual subscription was commuted into fees, payable on passing the several examinations (namely, the classical, two guineas—the minor, three guineas—the major, five guineas), and on admission to life membership an additional fee of five guineas,—making a total of fifteen.

We are, however, informed that another obstruction to the progress of pharmacy exists in Scotland, namely, that the Faculty of Physicians and Surgeons in Glasgow grant diplomas for a very moderate fee, on passing a lenient examination, which diplomas confer a licence to practise medicine and surgery as well as pharmacy. It appears that young men, considering that it will be little, if any more trouble, to prepare for this examination than for that of the Pharmaceutical Society, attend a few lectures, acquire a smattering of medical and surgical knowledge, and having obtained the licence to practise in any branch of the profession, they open chemists' shops and prescribe across the counter. This has a direct tendency to encourage counter practice. The public become accustomed to resort to the chemist's shop for advice; and this habit is likely to increase in proportion to the prevalence of the custom of mixing the trade of the chemist with the profession of the medical practitioner. Under these circumstances, the members of the medical profession have no right to blame the chemists if, driven to an extremity by this unnatural competition, they encroach on the functions of rival shopkeepers, who otherwise would take the bread out of their mouths. Nor is the profession of pharmacy likely to thrive and prosper while those who ought to be its representatives and ornaments swallow the bait of the Faculty of Physicians and Surgeons for the sake of enjoying the privilege of free trade in counter practice, and thus sacrifice their legitimate position as Pharmaceutical Chemists.

THE FURTHER CONSIDERATION OF THE SALE OF POISONS BILL.

The Committee appointed to arrange and examine the documents relating to the Sale of Poisons Bill, and to further consider its provisions, have prepared a Report, which will be presented to the Council on the 3rd of February, and the subject will be discussed at the Pharmaceutical Meeting on the evening of that day. The investigation of the facts relating to the sale of poisons, with the

opinions of the Members, founded on practical experience in different parts of the country, has tended to confirm the impression previously entertained with regard to the impracticability of some of the provisions of the "Sale of Poisons Bill." The difficulties attending legislation on the subject do not vanish on a nearer approach; but it becomes more obvious that, by attempting too much, fresh obstacles arise, and that an Act of Parliament encumbered with the intricate and inconvenient details under consideration would be inoperative, on account of the impossibility of carrying its provisions into effect, and would also interfere with the legitimate wants of the public without ensuring immunity from danger.

The Members of the Society are advised to attend the meeting on Wednesday evening, Feb. 3rd, as the question is one which affects the interests of all dispensers of medicine, and in which their experience is likely to be useful to the public, not only by promoting judicious legislation, but by pointing out any imperfections which their practical experience may detect in the measures now under consideration. The attendance of members of the medical profession is also desirable, as their advice and assistance might considerably promote the object in view.

THE DENTAL PROFESSION.

In most febrile disorders there is a period called the "crisis." Whether this be indicated by coma, delirium, or an intermediate condition, it is usually considered to be the turning-point upon the struggle through which the safety of the patient depends.

Such is the critical state of the dental profession at the present time. A protracted lethargy was succeeded by a period of excitement, which induced healthy reaction, and the symptoms were in every respect favourable, when a slight intestinal disturbance threatened to undermine the constitution. Under judicious treatment, there is still reason to hope that the result may be satisfactory.

That this is a correct statement of the case will be seen by the following brief history of the dental movement. We have already detailed the circumstances under which two institutions were formed—namely, the Odontological Society and the College of Dentists—each having for its object the union of the members of the dental profession into one body. It was a common opinion among impartial observers of these proceedings, that the division into two parties was unfortunate, and that no permanent or satisfactory arrangement of the affairs of the profession could be effected until all minor differences could be merged in the one grand object, and the entire profession united into one body. This opinion has been gradually gaining ground among the members of both societies, and some of the questions at issue having been partially arranged, three members were appointed by the Council of each Society as delegates to confer upon the subject of the proposed amalgamation, and to settle the terms and conditions on which this union should take place, subject to confirmation by the respective bodies at special meetings of the members to be convened for that purpose. The delegates having duly considered and matured the proposed terms of amalgamation, these were approved and confirmed by the members of the Odontological Society, and on Saturday, the 2nd of January, the anniversary dinner of that Society took place at the Freemasons' Tavern, on which occasion the unanimity which prevailed was highly satisfactory; and it appeared to be the general opinion that the temporary division had proved in its results a favourable mode of uniting elements which, without some such preparatory process, might have been found almost incompatible. In the absence of Mr. Cartwright, the President of the Odontological Society, on account of indisposition, the chair was occupied by Mr. Arnold Rogers, one of

the Vice-Presidents. On the right of the Chairman was Mr. Robinson, President of the College of Dentists, supported by several of the most active and influential members of that body. The special meeting of the College had not at that time taken place, but those who spoke on its behalf expressed a confident hope that all obstacles had been surmounted, and that the adoption of the proposed terms of amalgamation would be unanimously confirmed on both sides. The company comprised the leading members of the dental profession in the metropolis, with a considerable number from distant parts of the conntry. The precise terms of amalgamation were not stated or discussed, but the attention of the meeting was confined to the broad principles of organization for professional improvement, the establishment of a recognized status for the dental profession, and the extinction of minor differences and unworthy jealousies in the determination to achieve the grand object in view. The assembly separated with the intention of holding similar meetings annually, for the purpose of promoting harmony and conviviality among the members, and thus cementing the union of the dental profession into a permanent and recognized body, under the name of the Institute of British Dentists.

The Special Meeting of the College of Dentists for the consideration of the proposal for amalgamation was held on the 8th of January, when a rather warm discussion took place, and while a general disposition appeared to prevail in favour of amalgamation, the terms upon which this was proposed to be effected were objected to by some members present, and after an animated debate, the proposition was rejected by a majority of seven. As only sixty-one members were present on that occasion, and a considerable number reside in the country, the three delegates on behalf of the College sent a circular to all the members, requesting an answer by return of post, whether in favour of the proposed union or not. A large majority of the answers were favourable to the union, but some of the parties objected to the terms. The decision of the delegates having been confirmed by the Odontological Society, and being supported by the moral influence of a majority of the members of the College, although officially rejected at the Special Meeting, the gentlemen who had acted as the representatives of the College in the endeavour to bring about the amalgamation found themselves in rather a delicate position, and felt that they could not continue to hold office while the result of their labours was repudiated by the tribunal on whose behalf they had acted. The resignations have, however, as we are informed, been suspended with a view to a further effort to clear up the sources of difference, on which some correspondence has taken place. The first objection urged against the proposition is, the substitution of the term Institute for that of College; but one of the dissentients, in a letter in the *Lancet* of Jan. 23, states that it is a mistake to say that the only objection was against the proposed title of the new institution. "The real objection," he says, "was the second clause of the suggested terms, wherein it was proposed to press the College of Surgeons to grant special dental diplomas. Now, the laws of the College of Dentists expressly state that one of its chief objects is to place the dental profession in an *independent* position."

It is not likely that a dispute about a name will be allowed permanently to interfere with the substantial prosperity of a valuable institution and the establishment of a professional status for the body of dentists, nor is the other objection one which can be sustained in opposition to the facts and arguments adduced on the other side. It is not yet certain that the Royal College of Surgeons will assent to the proposition to grant special Dental diplomas, the Court of Examiners for such purpose consisting of Surgeons and Dentists in equal numbers. That any objection should be made on the part of the Dentists, to what appears so desirable an arrangement, is to us a matter of surprise. It cannot be doubted that connexion with an old and respected corporation, such as the College of Surgeons, would confer a status and professional

character, which a new institution could not enjoy. Many years must elapse, and much exertion as well as meritorious performance of duty would be necessary, before an independent College of Dentists could occupy a position at all to be compared with that which would at once belong to a body in connexion with and sanctioned by the Royal College of Surgeons. This view of the case is adopted unanimously by the Odontological Society, and by the most influential members of the College of Dentists; but even those who originally entertained notions in favour of independence, are becoming sensible of the importance of concession. There is, therefore, every reason to believe that a satisfactory and permanent arrangement will shortly be effected. The Institute of British Dentists will be the centre of attraction, and the rallying-point for those who sincerely desire to promote the union of the profession into one body. Those who object to the present arrangement should recollect that in such cases some concessions must be made on both sides. It was not to be expected that the Odontological Society would dissolve itself, and that all its members would join the College, nor was it likely that the College would go over in a body to the Society. But the natural and proper course appeared to be that they should meet each other half way, both being merged into a new Institution under a new name, and with the mutual endeavour to conciliate.

We take leave to observe that there is one of the regulations which will require reconsideration—namely, that which stipulates that two-thirds of the Council shall retire annually, and shall not be eligible for re-election until after an interval of a year, and no member shall remain on the Council more than three consecutive years. We have witnessed the operation of a similar rule in some other cases, and have seen the props and mainsprings of an Institution dismissed from office under circumstances greatly to be regretted. In one instance, under our notice, it was found necessary to relax the rule by allowing a certain number of the retiring members to be immediately re-eligible.

Since the above was in type, we have been informed that further progress has been made towards the settlement of the existing differences between the two Societies, and that very few dissentients maintain their ground. The medical journals have warmly advocated the proposed organization and reform of the dental profession, and have noticed the temporary obstacle to the accomplishment of this object, as the sacrifice of a great principle on a frivolous pretext.

The *Lancet* observes, "If they are foiled in their attempt to raise the character of their profession, it will be a great public misfortune. The community has a right to demand that the man who styles himself a dentist should be possessed of the requisite qualifications for his calling. The only proper way to obtain this desirable object is by an Act of Parliament. The majority at the late meeting have acted with singular inconsistency, and by creating a division in the camp have embarrassed the executive of both Societies, and thereby injured themselves."

It is satisfactory to find that a favourable reaction has taken place, and that the threatened injury is likely to be prevented.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

ON THE USE OF METHYLATED SPIRIT IN THE PREPARATION OF MEDICINES.

The last number of the Transactions contains a copy of a communication addressed by the President and Censors of the Royal College of Physicians to the Board of Inland Revenue. The following is the reply :—

Inland Revenue Office, London, W.C., 3rd Dec., 1857.

Sir,—Your letter of the 25th ult., enclosing a copy of a Minute of the President and Censors of the Royal College of Physicians, having been laid before the Board of Inland Revenue,

I am directed to acquaint you that the permission granted by the Board to certain Chemists and Druggists for the use of methylated spirit in the preparation of medical tinctures and extracts was intended to be construed solely as removing any revenue restriction upon such use, without any interference whatever with the authority of the College for medical purposes.

In consequence, however, of your present communication, the Board are prepared to withdraw all such permissions already in force, and will withhold their consent from any future applications to the same effect.

But, before issuing any orders on the subject, the Board request to be informed whether the objection to the use of methylated spirit is confined to the cases specified in your letter—viz., medical tinctures and extracts—or whether it is desirable to prohibit the use of that spirit in all preparations included in the London Pharmacopœia.

I am, Sir, your obedient servant,

Francis Hawkins, Esq. M.D. Wm. Corbett, *Assist. Under Sec.*

The question was referred to the Pharmacopœia Committee of the College, and some communication also took place with the Colleges of Physicians in Edinburgh and Ireland. Subjoined is the

REPORT OF THE PHARMACOPŒIA COMMITTEE OF THE ROYAL COLLEGE OF PHYSICIANS
ON THE
USE OF METHYLATED SPIRIT IN THE PREPARATION OF MEDICINES.

Having considered the question propounded by the Secretary of the Inland Revenue Office, and referred to us by the President of the College of Physicians, viz.—whether it is desirable to prohibit the use of methylated spirit in all preparations used in the London Pharmacopœia, and having examined various specimens prepared for our inspection by the kindness of the President of the Pharmaceutical Society,

We are of opinion,

1. That wood spirit, of which methylated spirit contains ten per cent., is a variable preparation, containing an uncertain quantity of empyreumatic oils of a noxious kind.

2. That the manufacture and sale of methylated spirit have been permitted by the Legislature expressly on the ground that it is so nauseous that it cannot be substituted for or used in place of ardent spirits.

3. That preparations ordered in the London Pharmacopœia, when made with methylated spirit, differ materially in appearance, odour, and taste from the same when made with rectified spirit, and for the most part retain so much of the nauseous odour and flavour of wood spirit, that they are liable to occasion

the nausea headache and other disagreeable symptoms, which its empyreumatic oils, whether taken into the stomach or diffused in vapour and inspired, are known to produce.

4. That permission to use methylated spirit in some officinal preparations would act as an encouragement to its surreptitious use in others in which it was not authorized.

5. That there is no reason for the use of methylated spirit in the preparation of medicines, except the insufficient reason of its greater cheapness, which would be more than counterbalanced by the inferiority and noxious quality of the medicines thus prepared.

6. That consequently the substitution of methylated for rectified spirit in *any* of the processes of the Pharmacopœia should be strictly prohibited.

Signed on the part of the Committee,

FREDK. J. FARRE, *Chairman.*

AT A MEETING OF COUNCIL, *January 6th*, 1858,

Present—Messrs. Bell, Bird, Davenport, Deane, Hanbury, Keeling, Meggeson, Moore, Morson, Peacock, Sandford, Squire, and Waugh, the following were elected

MEMBERS.

LEICESTER.....Salisbury, William Bryan
MAURITIUS .....Avice, Charles Ernest
NEWPORT, MONMOUTH .....Williams, Henry Levi
NEWCASTLE-UPON-TYNE.....Coates, John Matthew

MAJOR EXAMINATION, *January 19th.*

Essery, William .....Plymouth
Humphreys, Richard .....London

MINOR EXAMINATION.

Ashton, John .....Belper
Dunn, James .....Durham
Francis, Thomas Harper .....Dulwich
Muskett, Edwin Burrell.....Holt
Nicholson, Frederick .....London
Seymour, George..... ...Oldbury
Slack, John Lawrence.....Ormskirk
Twinberrow, John .....London

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	ADDRESS.
Atkinson, John Parkinson.....	Messrs. Hurst and Morton.....	Louth
Pullin, William Henton	Mr. Parkes	Atherstone
Knowles, John Hiles	Mr. Anthony	Bedford
Tilden, William Augustus.....	Mr. Allchin	London
Weller, James William	Mr. Somerville.....	Bloxwich

IN EDINBURGH, *January 14th.*

MAJOR EXAMINATION.

Stephenson, John B. .....Edinburgh
Stirling, George .....Glasgow

MINOR EXAMINATION.

Nesbit, John . .....Berwick

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH.	ADDRESS.
Greig, Francis	Mr. Mackay	Edinburgh
Rainnie, Alexander.....	Mr. Stewart	Edinburgh

PHARMACEUTICAL MEETING,

Wednesday, January 6th, 1858.

MR. JACOB BELL, PRESIDENT, IN THE CHAIR.

The following Donations were announced:—

A complete copy of the *Proceedings of the Linnean Society*, together with No. *Journal of the Linnean Society*, from the Society.

Report of the Council of the Art-Union of London, from the Art-Union.

Medico-Chirurgical Transactions for 1857, from the Medico-Chirurgical Society.

Journal of the Photographic Society, from the Society.

Journal of the Society of Arts, from the Society.

Several Botanical Specimens from South Africa, consisting of Juncus serratus, together with preparations from them used in medicine by the African natives, from Messrs. Wicks and Ghislin.

The Chairman stated that it had been the intention of the Council to submit the results of the inquiries made by the Committee on the Sale of Poisons Bill before the present meeting, but it was found impossible to get the numerous answers which had been returned to the questions circulated by the Committee collated in time for that evening, and the further consideration of the subject was therefore postponed until the meeting in February.

The following communications were made:—

GLYCERINE A PROPOSED SUBSTITUTE FOR OILS AND FATS IN OINTMENTS.

BY G. F. SCHACHT.

The exhibition of cerates and ointments to diseased and tender surfaces, however necessary and beneficial at times, is always attended with certain inconveniences, resulting from some of their essential properties.

Among these may be mentioned the insolubility in water of the fatty matter which constitutes the mass of their substance, inasmuch as when the application has to be removed, the operation can only be accomplished either by considerable mechanical force or by the employment of soap, both of which methods it would generally be highly desirable, if possible, to avoid.

A second inconvenience presents itself in the fact that most of the remedies applied in this form are insoluble in fat. The excipient, therefore, in such cases, instead of facilitating the cure, acts to a certain extent in defending the part from the perfect action of the remedy.

But perhaps the strongest objection against the employment of fatty substances in skin diseases exists in the liability they possess of becoming rancid by oxidation—a property I believe to be inherent and unavoidable.

These considerations constitute, I think, sufficient justification for urging the trial of some more satisfactory excipient; and I hope, in the intrinsic claims to interest which the subject presents, sufficient excuse will appear for a notice which I confess to be far from complete.

A few months ago I was requested by Dr. William Budd, of this city, to contrive a formula of glycerine and starch (already, as he understood, employed in France), that should be applicable as a basis for this class of preparations. I have that gentleman's permission to say that the result of my experiments is highly satisfactory. The article produced presents the following fortunate aggregate of properties:—Its consistence is good, and does not vary with changes of temperature; it is soluble in water, and may consequently be removed from tender surfaces with the greatest ease; it dissolves and thoroughly mingles with all materials that are soluble in water, and therefore presents such remedies in the condition most favourable for absorption; and, lastly, it is not liable to rancidity, that is, as far as I have yet been able to

ascertain, the date of my first preparation being July 30th, and it having as yet presented no evidence of this kind of change.

The proportions I employ with such favourable results, are—

Glycerine, 1 fʒ.
Starch powder, 70 grs.

and the entire process consists in mixing the ingredients cold, and heating the mixture gradually to about 240° Fahrenheit, constantly stirring.

This constitutes a basis, with which may be produced preparations corresponding to most of the cerates and ointments of the Pharmacopœia, but free from the special peculiarities to which I have before alluded.

As the compound word amylo-glycerine, though perhaps the most appropriate, would from its length be somewhat inconvenient, I have adopted the term "Plasma,"* and by this name the few medical friends to whom I have shown the article are prescribing it. The simple word "Plasma" I apply to the excipient itself, and to it may be added the particular title of any special preparation—as, for instance, "Plasma Hydrargyri," the analogue of "Unguentum Hydrargyri" of the Pharmacopœia; "Plasma Potassii Iodidi," &c. &c.

Many of these preparations are made precisely according to the instructions given for their analogous ointments. Thus, by simple mixture of the ingredients, substituting the "Plasma" for the fats in the Pharmacopœia forms, are prepared—

Plasma Antimonii Potassio Tartratis.
" Belladonnæ.
" Conii.
" Creasoti.
" Gallæ Co.
" Hydrargyri Ammonio Chloridi.
" Hydrargyri Iodidi.
" Hydrargyri Nitrico Oxidi.
" Opii.
" Plumbi Iodidi.
" Sulphuris.
" Zinci.

But some are best made by slightly varying processes. Thus, "Plasma Cantharidis" I prepare by evaporating the decoction of the Spanish flies to an extract, and then mixing with the Plasma.

(FROM A CORRESPONDENT.)

* The word *Plasma* is derived from the Greek πλασσω, *I form*, and in its ordinary signification, means *something formed or moulded.*

It was however employed, occasionally at least, in a very different sense, and in one which renders its proposed application to an ointment not quite unobjectionable. We allude to *Plasma* as signifying *a wash for the throat* or *a gargle*, as in the following lines of Persius :—

Scilicet hæc populo, pexusque togaque recenti,
Et natalitia tandem cum sardonyche albus,
Sede leges celsa, liquido cum *plasmate* guttur
Mobile collueris, patranti fractus ocello.

Sat. I., v., 15—18.

Thus rendered by Drummond :—

See at the desk the pale declaimer stand;
The ruby beaming on his lily hand ;
Behind his back his wanton tresses flow;
With Tyrian dyes his splendid garments glow;
His pliant throat the liquid *gargle* clears;
His languid eye lasciviously leers.

Facciolati, after noticing the other and more usual significations of *Plasma*, says:—

"Est etiam potio ex dulcioribus quibusdam rebus conposita quâ colluebant os et fauces ad fingendam vocem, ut liquida esset, claraet, suavis: *gargarisma per la voce.*"—Pers. *Sat.* I., v., 17. (*Totius Latinitatis Lexicon*, t. iii.) See also Ainsworth, *Thesaurus Linguæ Latinæ*, Ed. 1752, in verbum.

For "Plasma Hydrargyri" I direct as follows:—

Take Mercury, ℥xij.
Glycerine, f℥xij.
Starch, ʒxiv.

Mix the starch with six fluid drachms of the glycerine, and gradually adding the mercury, stir till globules disappear. Then add the rest of the glycerine, and heat to 240° Fahrenheit, constantly stirring.

The "killing" of the mercury by this method is by no means a formidable task.

For "Plasma Hydrargyri Nitratis" I employ the following formula, which is by calculation the same as for the corresponding ointment, excepting the free acid which the fresh ointment always contains:—

Take Terbasic Nitrate of Mercury, ʒj.
Plasma, ℥j. ℔

A very elegant and useful preparation with Iodide of Potassium is made by dissolving the iodide in the glycerine, mixing in the starch, and heating to 240° as above—the proportions being Pharmacopœial:—

Take Iodide of Potassium, ʒij.
Glycerine, f℥ij.
Starch, 140 grs.

Mix as above.

The analogue of the Unguentum Iodinii Compositum I forbear to introduce, as, however valuable the iodide of starch may be, the preparation would cease to be an application of free Iodine.

But though not quite Pharmacopœial, I venture to add one other formula, which several medical gentlemen in my neighbourhood are now employing with considerable satisfaction in certain affections of the skin:—

"Plasma Petrolei."
Take Petroleum, ʒj.
Glycerine, f℥j.
Starch, 70 grs.

Rub the starch with the petroleum till quite smooth, add gradually the glycerine, and heat to 240° as above.

I need scarcely add, that for the production of a good result, good materials must be employed. Bottles sent out from wholesale and manufacturing houses, labelled "*Pure* Glycerine," and charged accordingly, do not always contain what their labels declare. Indeed, my experience during the last few months, leads me to think that really pure glycerine is not to be met with in commerce. Some samples called pure are rich in lead, others contain chlorine, most are diluted with water, and the best I have been able to procure is acid.*

I have found it necessary, therefore, to purify even the best samples (Price's), by digesting them for several days with powdered chalk, allowing the latter to subside, and decanting.

With glycerine thus obtained, and a little care, beautiful results are obtained.

I must, however, mention one imperfection to which these preparations are liable—namely, a tendency, after three or four months' existence, to lose more or less their original fine consistence, and become softer. This is an unfortunate quality, but I think it is one for which experience will be able to suggest a remedy.

Samples of the more important of these preparations will be placed upon the table for inspection.

7, *Regent Place, Clifton.*

[The employment of glycerine in combination with amylaceous substances as a basis for ointments was introduced ten or twelve years ago by Mr. Startin.

* To detect this acidity, it is necessary to dilute the glycerine with an equal bulk of water. Its action upon litmus paper is then sufficiently decisive.

In a paper by that gentleman, *On the Introduction and Therapeutic Uses of Glycerine* (*Journ. Soc. Arts*, March 7, 1856), the following formula is recommended:—Gum Tragacanth, ½ oz.; Glycerine, 1 oz.; Lime Water, 2 oz.; Rose Water, enough to form a soft jelly. This is an elegant material, and appears to be less deliquescent than Mr. Schacht's *Plasma*.

Another compound of the same character, introduced by Mr. Startin, consists of a thick paste or jelly formed by boiling rice flour with a little water and glycerine. This affords an excellent basis for some ointments, but we are informed Mr. Startin has discontinued the use of such applications.—Ed. *Ph. Journ.*]

The Chairman said the subject to which the paper referred was an important one. The greatest difficulty that appeared to him to stand in the way of using glycerine as proposed by the author, was that of getting a constant supply of pure glycerine that could be depended upon. This difficulty was not so great now as it was some years ago, Price's Candle Company having produced a very pure glycerine, that would probably be well suited for the purpose proposed; but it was a question for consideration how far this one source could be relied upon.

Mr. Squire thought the fact that the proposed preparations absorb moisture would be a drawback to the advantages which they appeared in some respects to present.

Mr. Redwood said the Council of the Society had already acknowledged the importance of this subject by offering a prize for an essay on the preparation of ointments and cerates. He believed Mr. Deane, who had suggested the subject for the prize, considered at the time that probably some new basis or excipient for the class of preparations referred to might be found that would be less liable to change than the fats usually used. Cocoa-nut oil had been suggested, and other fats had been tried, but no results of much importance had yet been obtained in that direction. With reference to the preparations proposed by Mr. Schacht, in which glycerine and starch paste were to take the place of the fats contained in ointments and cerates, he thought the starch would not penetrate and be absorbed by the skin so readily as fat. This, of course, should be determined by experiment. The subject would require a great deal of consideration and further investigation before "plasma" could be recommended as a substitute for the fats at present used. Even if "plasma" should be found to be a better menstruum than fat for the application of certain active ingredients to the skin, in consequence of its being a better solvent, as in the case of iodide of potassium, it did not follow that it should be so in all; and he doubted whether in mercurial ointment it would answer so well. In this case the fat dissolved a notable quantity of oxide of mercury, which Mr. Donovan had pointed out as the really active part of mercurial ointment. The great difference existing in the degrees of purity of the glycerine met with in commerce seemed also to stand in the way of this proposed application of it. Some of the impurities of commercial glycerine would render it quite unfit for the proposed use; and although, as the Chairman had stated, the manufacture of glycerine had been recently much improved, there was an application of glycerine that had been quite recently patented, which, if carried out, would probably absorb all the glycerine produced in this and every other country—he alluded to its use in the manufacture of paper for printing, with the view of obviating the necessity of wetting the paper before printing upon its surface.

Mr. Haselden remarked that there was no reference made in the paper to the density of the glycerine employed. He thought this important, as commercial glycerine differed greatly in this respect, and the density not only affected its price, but also its solvent power, and the consistence of the products obtained with it.

Mr. Whipple concurred with what had just been stated. The specific

gravity of glycerine was often overlooked or considered unimportant, in comparison with its purity, in other respects than the presence of water. He believed the best glycerine, and that most suitable for the proposed purpose, was that produced in the manufacture of lead plaster. He always made this of a density 1.26, which was the density indicated, very correctly, in the Dublin Pharmacopœia. All the colourless glycerine he had seen in commerce was of a less density than the above. He had suggested the use of glycerine in ointments some time ago.

Mr. Binnington suggested that the starch contained in the plasma might possibly cause irritation of the skin in some cases, and if there was any liability to this, it would be a serious objection to the proposed form.

The Chairman thought the effect of the starch on the skin was an important question, which should be decided by the medical profession. He did not think it was necessary to look upon the proposed preparations as intended to supersede ointments. They might possess advantages in some cases, in consequence of the superior solvent power of the glycerine, although not in all cases.

Mr. Squire said that glycerine did undoubtedly possess a remarkable solvent power with reference to some substances, as, for instance, borax.

Dr. W. S. Squire observed that if plasma should be adopted as the means of application for some substances, in consequence of the superior solvent power of the glycerine, while other substances were more advantageously applied in the old form of ointment—the fat being a better solvent than the glycerine—there would be this inconvenience experienced: that the two kinds of preparation could not be mixed together, for he had found that glycerine will not mix with ordinary fats.

ON IODIDE OF LIME.

Dr. Pidduck made a verbal communication on a preparation of iodine which he has been using for some time with success, and which he wished to bring under more general notice.

He stated that the preparation was made, at his request, by Messrs. Morson, of Southampton Row, in 1855.

That it consisted of iodine and lime in the proportion of one part of iodine and seven parts of lime (probably in a similar state of combination to that of chlorine and lime in the so-called chloride of lime), and therefore it was named Iodide of Lime.

That, the affinity being feeble, the salt required to be kept in a well closed bottle.

That, in solution in boiling water, the whole of the iodine is dissolved, forming a permanent solution, which is not decomposed by long keeping, nor by exposure to the air: only a deposit takes place of the superfluous lime in the form of a carbonate.

That the proportions used in the solution (of which a specimen was exhibited) were one drachm of the salt and one pint of boiling water, which, when cold, was filtered through bibulous paper, forming a colourless transparent solution.

That a drachm of the salt containing eight grains and a half of iodine, a fluid ounce of the solution contains half a grain of iodine.

That the iodine in the solution exists in the form of iodide of calcium and iodate of lime.

$$6\,CaO + 6\,I =$$
$$5\,CaI + CaO,IO_5$$

That the solution is decomposed by an acid, and the iodine is set at liberty: hence the utility of this form for the administration of iodine, probably in the state of an oxide.

That the superiority of this preparation to the iodide of potassium consists—

1. In the comparative smallness of the dose, and in the minute state of its atomic division.
2. In its ready combination with the blood and tissues, manifested by its alterative effects.
3. In not passing off so quickly through the kidneys.
4. In not producing gastro-enteritic and vesical irritation.
5. In being inexpensive and easily prepared, and therefore not liable to adulteration.
6. In being nearly tasteless, and therefore readily taken, even by children; and admitting of a variety of combinations in extemporaneous prescription.

Dr. Pidduck entered somewhat at length into the therapeutic effects of this form of iodine in the treatment of disease in those intractable cases of neuralgia caused by metallic poisons, such as mercury, lead, and copper, for which purpose it had been extensively prescribed, in small doses of $\frac{1}{4}$ of a grain, at the Bloomsbury Dispensary during the last two years, with marked good effect. This, being foreign to the objects of the Society, is omitted in this notice.

Mr. Bell wished to know whether Dr. Pidduck had made corresponding experiments with the view of comparing the effects of his new remedy with those of equally small doses of iodide of potassium, as the latter substance was usually given in much larger doses than those mentioned by Dr. Pidduck.

Dr. Pidduck replied that he had not made corresponding experiments with the iodide of lime and iodide of potassium.

Mr. Squire observed that the solution recommended by Dr. Pidduck would not be uniform in composition, as the free lime contained in it would be separated in the form of carbonate from exposure to the air.

Dr. Garrod said the subject of Dr. Pidduck's communication was partly chemical and partly therapeutical; the latter, he thought, could not be discussed with advantage before that Society, but he wished nevertheless to state that the credit of having introduced the use of iodine, in the form of iodide of potassium, as a remedy in the class of cases to which Dr. Pidduck had referred, was due to Melseigne, who had produced the same good effects with iodide of potassium that Dr. Pidduck obtained with the salt of lime.

Mr. Ghislin described the botanical specimens from South Africa, of which specimens had been presented to the Society.

ON *ROTTLERA TINCTORIA* ROXB., AND ITS MEDICINAL PROPERTIES.

BY DANIEL HANBURY.

The peculiar red powder which is obtained from the capsules of *Rottlera tinctoria* Roxb., a tree of the Natural Order *Euphorbiaceæ*, has long been used in India on account of its valuable properties as a dye for silk.

This substance first claimed my attention in the year 1852, while examining a collection of drugs formed at Aden by my friend James Vaughan, Esq., and I published a few remarks in the *Pharmaceutical Journal* for June, 1853,* pointing out its botanical origin and what I then knew of its economic uses.

Its application as a remedial agent having recently attracted attention in this country, in consequence of the favourable reports made by several practitioners in India, who have found it eminently successful in the treatment of *tænia*, I think it may be not uninteresting if I briefly recapitulate its history, and quote some of the statements that have appeared regarding its medicinal properties and mode of administration.

The genus *Rottlera*, so named in honour of the Rev. Dr. Rottler, an eminent Danish missionary and naturalist, was, as at present restricted, founded by Roxburgh in 1798.

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* *On* Wurrus, *a dye produced by* Rottlera tinctoria, *Pharm. Journ.*, vol. xii., p. 589.

Rottlera tinctoria Roxb.* is a tree of from 15 to 20 feet in height; it is common in the hilly districts of India from Burma to the Punjab, and from Ceylon to the hot valleys of the whole of the Himalaya, where it ascends to an elevation of 5000 feet; it is found in the Phillippine Islands, in China, and in North-Eastern Australia; it appears also to occur in the South of Arabia and in the Somali country, from which regions the dye obtained from it, is carried to Aden for sale.

The fruit of the tree is tricoccous and of the size of a pea, covered on the outer surface with minute, sessile, roundish, semi-transparent glands of a bright red colour. According to Roxburgh the fruit ripens in February and March, at which period it is gathered, and the red, glandular powder is carefully brushed off and preserved for use.

Before further describing this substance, I may properly advert to the names by which it and the tree affording it, are known to the natives of India; for some information on which part of the subject, I am indebted to the kindness of Professor H. H. Wilson, of Oxford.

The Sanskrit name of *Rottlera tinctoria* is पुन्नाग *Punnaga*, a word having several synonyms, among which are तुंग *Tunga* and केसोर *Kesora*;—hence in Bengali we have *Punnág*, *Kesor* and *Tung*, and in Hindustani *Punnág*.

The red powder from the capsules is called in Bengali কামলা *Kámalá*, abbreviated to *Kámal*. The Sanskrit word कपिल *Kapila*, signifying *tawny* or *dusky red*, would appear to be also applied to it. In the Tamil language the substance in question is termed *Kapilapodi*, a name compounded of the Sanskrit *Kapila* and the Tamil பொடி *Podi*, the latter word meaning the *pollen of a flower*, or *dust in general*.

Vasantagandha, a Sanskrit word meaning *spring-fragrance*, is, according to Roxburgh, a designation in the Telinga or Telugu language of the same red powder. In the bazaar at Aden, it is known as an article of trade under the name of ورس *Waras*, a word properly signifying *saffron*. It is probable, however, that this term has been given by the Indian Mohammadans, and is not used as a designation of the powder elsewhere.

The Hindustani name *Kámalá* has, with slight variations in spelling, been adopted by the Europeans in India, and I shall therefore employ it (omitting the accents indicating the long quantity of the vowels) as the most convenient term by which to designate the red powder derived from the capsules of *Rottlera tinctoria*.

Kamala, as found in the Indian bazaars, has the aspect of a brick-red powder, possessing from its structure that peculiar mobile character which we notice in Lycopodium and Lupuline. It also agrees with Lycopodium in the difficulty with which it is mixed with water, and in the manner in which it ignites when thrown into the air over the flame of a candle. Examined with a lens, or still better with the compound microscope, it is seen to consist of garnet-red, semi-transparent, roundish granules, of from $\frac{1}{500}$ to $\frac{1}{250}$ of an inch in diameter, more or less mixed with minute stellate hairs and the remains of stalks, leaves, &c.: the latter substances however are easily removed by careful sifting, the drug thereby acquiring a brighter red colour and more uniform appearance.

Kamala has but little smell or taste. It is insoluble in cold water, and nearly so in boiling water. It is soluble in a solution of an alkaline carbonate, and still more so in one of caustic alkali, a deep-red solution being in either case produced. The addition of an acid to these solutions occasions a precipitate of resinous matter.

Treated with alcohol or ether, Kamala affords a large proportion of soluble

* Roxburgh, *Plants of the Coast of Coromandel*. No. 168.

matter and a solution of a beautiful deep-red colour. The alcoholic solution upon the addition of water becomes turbid from the precipitation of resin. By repeated digestions in hot alcohol, the whole of the resinous colouring matter of Kamala may be removed, a pale-whitish substance being the only residuum.

Dr. Thomas Anderson, Regius Professor of Chemistry in the University of Glasgow, who has made Kamala the subject of special investigation,* finds that if a concentrated ethereal solution of Kamala be allowed to stand for a couple of days, it solidifies into a mass of granular crystals. If these be drained, pressed in bibulous paper, and purified from adhering resin by repeated solution and crystallization in ether, the crystalline substance is obtained in a state of purity. It then consists of yellow crystals having the form of minute plates and a fine satiny lustre. This substance has been named by Dr. Anderson *Rottlerine*.

Dr. Anderson states that Rottlerine is insoluble in water, sparingly soluble in cold alcohol, more so in boiling. In ether, it is readily soluble. It dissolves in an alkaline solution with a dark-red colour. Its alcoholic solution is not precipitated by acetate of lead.

Bromine instantly decolourizes it, with formation of a substitution-product, which dissolves readily in spirit, and is thrown down by the addition of water. This compound does not crystallize, and could not be obtained in a state of purity. Nitric acid oxidizes Rottlerine, forming at first a yellow resinous matter, and by longer continued action a quantity of oxalic acid. Concentrated sulphuric acid in the cold dissolves it with a yellow colour, which, on the application of a gentle heat, becomes first red, and finally very dark, sulphurous acid being evolved. Heated on platinum it fuses into a yellow fluid, which decomposes at a higher temperature, giving off pungent fumes and leaving a bulky charcoal.

The mean result of four analyses gave the composition of Rottlerine as

		Calculation.		
Carbon.....	69.112	69.47	C_{22}	132
Hydrogen	5.550	5.26	H_{10}	10
Oxygen	25.333	25.27	O_6	48
	99.995	100.00		190

The attempts made to confirm this formula have not led to any definite result, Rottlerine forming no compound with the metallic oxides, and that with bromine not having been obtained sufficiently definite.

A concentrated alcoholic solution of Kamala deposits upon cooling a pale flocculent matter, sometimes in such abundance as completely to fill the fluid. This substance is soluble in boiling alcohol, but sparingly in cold; hardly soluble in ether, and insoluble in water. It appears to have no crystalline structure. It gives no precipitate with the salts of lead or silver, and does not appear to form a compound with any other substance. In drying it shrinks much, resembling hydrate of alumina coloured with oxide of iron. The quantity obtained was, however, too minute for a full investigation of its properties.

From Professor Anderson's experiments, the composition of Kamala may be thus stated:

Resinous colouring matters (including Rottlerine)	78.19
Albuminous matters	7.34
Cellulose, &c.	7.14
Water.....	3.49
Ash.....	3.84
Volatile oil.....	trace
Volatile colouring matter	?
	100.00

* On the Colouring Matter of *Rottlera tinctoria*, *Edinburgh New Philosophical Journal*, Jan.—April, 1855, p. 296.

Kamala is used throughout India as a dye for silk, its colour being extracted by boiling it in a solution of carbonate of soda. I have a specimen of silk dyed with it, which is of a rich orange-brown. The root of the tree is said to be also used in dyeing. In Indian medicine, Kamala is considered as "of a warm nature," and is given as an anthelmintic in very small doses.* It has also some repute as an application in certain cutaneous complaints. Among the Arabs of Aden, it is administered internally in leprosy, and is used in solution to remove freckles and pustules.† Dr. William Moore, of Dublin,‡ Physician to the Institution for the Diseases of Children of that city, has made some trials of it in *Herpes circinatus*, by rubbing the powder over the eruption with a piece of moistened lint. Dr. Moore states that two or three applications, accompanied with the internal administration of alterative doses of Rhubarb and Grey Powder, sufficed for the removal of the disease.

It is however in its character of an anthelmintic that Kamala appears most to deserve the attention of the medical man and pharmaceutist.

Referring to the reports that have been published, we find that the anthelmintic powers of Kamala have been investigated in India by Drs. Mackinnon, Anderson, Corbyn, and Gordon.

Trials of the drug in this country, have as yet been very few. Dr. Arthur Leared, who has been one of the first to prescribe it in London, has recorded one successful case,§ since which he informs me he has had four others also successful.

Dr. C. Mackinnon,‖ Superintending Surgeon, Bengal Medical Establishment, in introducing to notice the new remedy, states:—

> "My attention was first called to it by a gunner of the brigade, affected with tapeworm, in whom both turpentine and kousso had failed to expel the worm. He stated that a companion of his affected with tape-worm, had taken the remedy with success. I immediately sent for some, and, without any previous preparation of the patient, gave him 3 drachms. He was a large powerful man, and this producing no effect, in 4 hours afterwards the same dose was repeated. It now operated very freely and frequently, and with the fourth stool a large tapeworm, 6 yards long, was passed.
>
> The result was so satisfactory, that I have continued to employ the remedy whenever a case presented itself; and I have now given it in 16 different cases, and in all without a failure. As far as my experience goes, I have found it a better and more certain remedy than either turpentine or kousso, and much less disagreeable to take than either of these remedies.
>
> In none of my cases subsequent to the first, did I ever exceed for a single dose 3 drachms. This usually purges from five to seven times, and the worm is usually expelled dead in the fourth or fifth stool.
>
> In two of the later cases in which I administered it in Hospital, both patients recently recovered from fever, and still weak, the dose of 3 drachms purged very violently,—from a dozen to 14 times. In three subsequent cases I reduced the dose to 1½ drachms, and no action on the bowels succeeding it, I gave in six hours afterwards half an ounce of Castor-oil. This acted four or five times, and in each case the worm was passed dead.
>
> * * * * *
>
> In almost every case the long slender neck of the worm appeared in the motion.
>
> To a native child of five years of age, I gave a dose of 40 grains, and a tapeworm was duly expelled. The drug usually purges speedily. In about half the cases, some degree of nausea and slight griping were experienced; in the

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* Irvine, *Materia Medica of Patna*, Calcutta, 1848, p. 48.

† Vaughan in *Pharm. Journ. and Trans.* Vol. xii. p. 386.

‡ On the value of the *Rottlera tinctoria* (Kameela) as a local application to *Herpes circinatus*, by Wm. Moore, M.B., &c. *Dublin Hospital Gazette*, Nov. 15, 1857, p. 345.

§ *Medical Times and Gazette*, Dec. 19, 1857, p. 628.

‖ *Indian Annals of Medical Science.* Ed. 2, No. 1, p. 284. Calcutta, 1854.

remaining half, no inconvenience whatever was sustained, some of the patients declaring it to be the easiest purge they had ever taken in their lives. * * * * *"

Dr. Mackinnon gives the following summary as the result of his experience:

1. That *Kamala* is a safe and efficient remedy for tapeworm, and more certain than either turpentine or kousso.
2. That to a strong European 3 drachms may be safely given as a dose.
3. That to a person of feeble habit or to a female, 1½ drachms, followed, if necessary, by half an ounce of castor-oil, is a sufficient dose.

Since the paper from which the foregoing are extracts, was published, Dr. Mackinnon has stated* that in subsequent more extensive trials of Kamala, during which he has administered it to nearly 50 patients, in two instances only was no worm expelled.

Dr. Anderson, Assistant Surgeon, 43rd Regt. Light Infantry,† states that the occurrence of tapeworm is very common among the Europeans serving in the Punjab, and that it is also prevalent among the Mussulman population of that province.

"The vermifuge properties of Kamila," writes Dr. Anderson,

"are as well marked as those of any of the best reputed anthelmintics, not excepting the Abyssinian remedy *Kousso*. The only objection to it is, that when the powder is used, considerable nausea occasionally follows, but certainly not more than what is produced by the sickening preparation of pomegranate root and other anthelmintics.

"After three drachms of the powder have been administered, the worm is usually expelled in the third or fourth stool. It is generally passed entire, and almost always dead, and in all the cases I have examined (about 15), I was able to detect the head. In only two cases do I know of the worm being passed alive. The advantage of the tincture over the powder consists in its action being more certain and milder, and in it being rarely accompanied by nausea and griping. In two or three cases, only two or three stools followed the dose usually given, and the worm was expelled in the second stool; in one patient, only one stool was caused by the medicine, and in it, the worm came away dead."

Dr. Anderson alludes to 95 cases of tapeworm in which *Kamala* was prescribed, and of this number he was aware of only two in which no worm was expelled. Of these 95 cases, 86 were European soldiers, 8 were Mussulman natives, and one was a Hindu of the lowest class. All these persons were in the habit of indulging freely and constantly in animal food, and among this class tapeworm is common: those, on the other hand, whose animal diet is less copious are less liable to tænia, while among several native regiments, Hindu Sepoys and servants, says Dr. Anderson, whose food is entirely vegetable, the parasite is unknown.

Dr. C. A. Gordon's experience of the efficacy of Kamala corresponds entirely with that of Drs. Mackinnon and Anderson. He observes,‡

"With Kameela there is no unpleasant effect. It is not even necessary to take a dose of purging medicine as a preparative; and beyond a trifling amount of nausea and griping in some instances, no unpleasant effects are experienced; while by far the greater number of persons to whom it is administered suffer no inconvenience whatever beyond what they would from a dose of ordinary purging medicine."

The observations of Dr. Gordon relative to the occurrence of tænia are confirmatory of those of Dr. Anderson, and are to the effect that the free use of animal food of very indifferent quality among the British troops in the N.W. Provinces, must be regarded as the cause of the prevalence of the malady. In

* *Indian Annals of Medical Science*, vol. iii. (1856), p. 86.

† On *Rottlera tinctoria*, as an article of the Materia Medica. *Indian Annals of Medical Science*, vol. iii. (1856), p. 82.

‡ *Medical Times and Gazette*, May 2, 1857, p. 429.

the case of soldiers stationed at Peshawur, tapeworm is so common, that it is believed that every third man suffers from it during the two years that the regiment usually remains there. To give Dr. Gordon's own words:—

> "Those who have escaped the misfortune of having had to pass some years in India, can form no idea of the vast herds of lean, half-starved pigs that roam over the fields and waste grounds in the vicinity of villages; neither can they have any conception of the nature of the food on which these pigs subsist."

After some revolting details as to the habits of swine in India, Dr. Gordon continues:

> "Pigs, however, are not the only animals that live in this filthy manner in India. Cattle and sheep, that are so particular in their food in Britain, acquire degenerate tastes in India; and it is needless to enter into similar particulars regarding ducks, fowls, turkeys, and pigeons, all of which are more or less used as food by our countrymen there."

The dose of Kamala may be stated as from ½ a drachm to 3 drachms suspended in water: a single dose is frequently found sufficient, and in general it is not necessary to give any other medicine before or after. In some cases, however, where but a small dose of Kamala has been administered, castor-oil has been afterwards given with good effect. Dr. Gordon has prescribed Kamala in the dose of 1 drachm, repeated at intervals of three hours.

Kamala may also be given in the form of Tincture; the formula for which, recommended by Dr. Anderson, is as follows:

℞ Kamalæ, ℥vj.
Spiritûs rectificati, f℥xvj.
Macera per biduum et cola.

An ethereal tincture may be prepared of the same strength, but it is said to offer no particular advantage over the alcoholic.

The dose of *Tinctura Kamalæ* is from ʒj to ʒiv, diluted with some aromatic water.

PHARMACEUTICAL MEETING, EDINBURGH.

January 14*th*, 1858.

MR. JACOB BELL, PRESIDENT, IN THE CHAIR.

ON THE EMPLOYMENT OF RED PHOSPHORUS IN THE MANUFACTURE OF LUCIFER MATCHES.

BY PROFESSOR GEORGE WILSON.

Much interest has been attached within the last nine years to the properties of Red or Amorphous phosphorus. Familiar to Chemists for some two centuries, but mistaken for an oxide of itself, it was not till 1848 that it was unequivocally demonstrated by Schrötter, of Vienna, to be an allotropic, or modified form of ordinary phosphorus. As in other cases, what so long eluded our grasp, was no sooner distinctly identified, than modes of producing it multiplied on our hands. We now know that when common (or vitreous) phosphorus is burned in the air; is exposed in vacuo to a high temperature in nitrogen or carbonic acid; or in the same circumstances, or under water to direct sunlight; or is made to unite with a small amount of iodine, it is converted without loss or gain of weight into red or amorphous phosphorus. It is most easily procured in large quantity by keeping phosphorus for several days at a temperature a little below 260° C.

As thus obtained it constitutes a brittle, friable mass, uncrystalline, unvitreous, imperfectly conchoidal in fracture, and varying in colour from purple-brown, red-brown, and iron-grey, to brick-red, scarlet, and crimson. The powder is always some shade of red; the larger pieces in proportion as they are compact, exhibit the darker tints, and occasionally an imperfect metallic lustre.

This amorphous phosphorus differs from ordinary phosphorus in nearly every character. It has a higher density; a greatly higher point of fusion, and a still higher point of combustion: it is insoluble in sulphuret of carbon, alcohol, ether, and

other liquids which dissolve ordinary phosphorus: it does not at common temperatures evolve an odour, or shine in the dark, or develop ozone; and with various of the chemical elements which unite energetically with the ordinary phosphorus, it either does not unite at all, or unites sluggishly. To living animals it may be administered internally in doses of many grains, without exerting any poisonous or indeed marked physiological action upon them. At 200° C. it becomes luminous; at 250° C. it melts; at 260° C. it is converted, if in vacuo, into ordinary phosphorus; and if in the air takes fire. In short, it is phosphorus as we are most familiar with it, with all its affinities lowered in intensity, its fiery, poisonous energies for the time laid aside, and its claim to the special title of Phosphorus or Light-Bringer, resigned altogether for a season. At the same time these energies are but as it were sleeping under a cloak or mask, and can be aroused by very trifling causes into their original activity, and amorphous phosphorus is thus practically as powerful an agent as ordinary phosphorus, whilst it is much more manageable. The one is like fulminating silver, with difficulty preserved from explosion; the other like gunpowder, as harmless as charcoal till it is kindled.

It was natural that industrialists should avail themselves of amorphous phosphorus as a substitute for ordinary phosphorus in the art of lucifer match making, and Schrötter's process having been patented, Mr. Albright, of Birmingham, one of the largest makers of phosphorus in the country, undertook the manufacture of amorphous phosphorus, and has for several years prepared it on a considerable scale.

Common phosphorus is liable to three very serious objections as a constituent of lucifer matches.

1. It is so combustible, that matches containing it have, by accidental kindling, proved on various occasions the cause of destructive conflagrations. In different Continental countries, indeed, Government has formally interdicted the employment of lucifer matches, especially in summer, and in agricultural and forest districts.

2. It is found to develop in those daily engaged as makers of lucifer matches, in handling it, a most painful disease of the jaws, occasioning protracted suffering and partial or total destruction of the maxillary bones.

3. Its poisonous properties, even in minute doses, have occasioned many fatal accidents to children who have sucked or swallowed the charged ends of lucifer matches, and to adults whose food has inadvertently been brought in contact with these. And cases have not been wanting of murder being committed by the administration of coffee and other liquids rendered poisonous by their impregnation with the phosphorized tips of matches.

Amorphous phosphorus has none of those dangerous properties, and though much less inflammable than ordinary phosphorus, it is readily kindled by the friction to which, in whatever way prepared, a lucifer match is always subjected. Accordingly, Mr. Albright has endeavoured, I fear with less success than he deserved, to introduce red phosphorus matches into use in this country; and similar endeavours have been made abroad. In Sweden, in particular, they have adopted the ingenious device of dividing the contents of the inflammable paste ordinarily employed to tip the matches, between the match and the friction paper or rubbing surface of the box, so that the sulphur and nitre alone are attached by gum or glue to the splint of wood, and the phosphorus in the amorphous condition is spread on the box or friction-paper. With this arrangement the risk of fire is greatly lessened, seeing that neither the match alone, nor the friction-surface alone, is dangerously combustible. The substances attached to both, moreover, are devoid of poisonous qualities, unless in large quantities.

These valuable properties of red phosphorus, however, are accompanied by a serious drawback, which has only recently been recognized by a French Chemist of well-known skill and accuracy. M. M. J. Personne, in a communication made to the French Academy of Sciences last summer (*Comptes Rendus*, 20th July, 1857), points out that, although amorphous phosphorus remains unchanged in closed vessels containing dry air, it oxidizes into phosphorous and phosphoric acids when exposed to a moist atmosphere. The statement, accordingly, hitherto universally received, that amorphous phosphorus does not oxidize at ordinary temperatures, must be qualified by the admission that it does oxidize if the air be moist. M. Personne points out the obstacle which this unexpected property of red phosphorus presents to its employment in lucifer matches, and I fear that his conclusions are beyond question. I have not been able to repeat his experiments with amorphous phosphorus of unquestion-

able purity, but I find that the large and beautiful specimens with which Mr. Albright favoured me some years ago, and those also which more recently he has conferred upon the Industrial Museum, suffer in humid air the change which M. Personne describes.

In truth, without special experiment, I was recently led, long after reading his paper, to recal its contents, in consequence of finding the specimens which I now show the Society undergoing deliquescence. One in particular, contained in a glass jar, covered with paper, had changed from a loose aggregate of dry lumps into a wet pasty mass, having a strong acid taste and reaction, and yielding to water, phosphorous and phosphoric acids. The same change I found had occurred to all my specimens of amorphous phosphorus except one made in my laboratory six or seven years ago, and carefully excluded from the air ever since in a narrow test tube. The other samples in wide-mouthed, loosely-stoppered, or lightly covered bottles and jars, had become sensibly moist and strongly acid. The change is most apparent in the scarlet and brick-red specimens, and least in those which are dark brown or with a shade of purple. The former are the less massive and more pulverulent of the two, and in consequence of their porosity, act, as I believe, like spongy platina or wood charcoal, condensing into their pores oxygen, and then suffering oxidation.

This deliquescence is undoubtedly an objection to the use of amorphous phosphorus in the manufacture of matches, but it is not an insurmountable one. Matches made in the ordinary way, but with amorphous phosphorus, must be shut up when not in use, and will not, if so excluded, deliquesce more, or even so much, as common lucifer matches. Those made after the Swedish fashion, with the inflammable constituents divided between the match and a friction surface on the box, should be so arranged that the surface shall be on the inside of the box, or if external, the layer of red phosphorus should be varnished over. In all cases, the darker and less spongy the phosphorus, plainly the better. The employment of amorphous phosphorus must not be lightly abandoned. It is not dangerously inflammable or poisonous, and the acids into which it deliquesces are also harmless. The opposite, indeed, has been affirmed, but Personne has shown that even in large doses these acids are quite innocent. For the sake accordingly alike of the workmen engaged in match manufactories, and of the general public, we must urge further trials with the amorphous phosphorus.

The Chairman said the thanks of the Society were due to Professor Wilson for his interesting paper. It had brought to his recollection the circumstances under which he had visited Manchester some years ago for the purpose of making inquiries on this subject, and seeing some patients there suffering under the phosphorus disease. He had visited several manufactories, and seen patients who had been cured with the loss of several teeth or a jaw, and others he saw in the Manchester Infirmary under treatment. He had been favoured with the lower jaw of a young woman who had recovered, and returned to her previous occupation. The jaw, which was now in the Museum of the Pharmaceutical Society in London, had sloughed away almost entire. He was desirous of ascertaining whether the disease depended on the chemical action of the phosphorus in the bone, or whether the poison acted merely as an irritant producing inflammation. The question had not been satisfactorily solved, and he hoped Professor Wilson would continue his investigations, so as to trace the cause and ascertain the best mode of preventing the disease, which was very painful and distressing.

Prof. Wilson said he should continue his researches, and would be glad to receive any additional information as to the history of the disease, and specimens of the diseased bone for examination.

ON METHYLATED SPIRIT.

BY MR. J. F. MACFARLAN.

In my former papers on this subject, the object was chiefly to show the application of methylated spirit in the preparation of various articles employed in science and the arts, and the success with which it had been attended. The present relates rather to the methylated spirit itself, and to the question whether it can readily be purified, so as to be rendered available for potable purposes.

The question, indeed, was so thoroughly canvassed by the able and learned gentlemen, Professors Graham, Hofmann, and Redwood, to whom the matter was originally committed by the Board of Inland Revenue, as to leave little room for doubt. In their recapitulation of the results of the inquiry, these gentlemen remark, page 28:*—"It has been shown that methylated spirit resists any process for its purification; the removal of the substance added to the spirit of wine being not only difficult, but to all appearance impossible; and further, that no danger is to be apprehended of the methylated spirit being ever compounded, so as to make it palatable." Some doubt having, however, been thrown on this matter, in connexion with the preparation of sweet spirit of nitre, the question was referred to Mr. G. Phillips, the Chemist attached to the Inland Revenue Department, whose ability and skill as an experimental Analytical Chemist are well known, for further examination. Accordingly that gentleman entered on a series of experiments, the result of which fully satisfied the Honourable Board of the soundness of the opinion expressed by the learned gentlemen, and consequent safety of continuing to permit the use of the methylated spirit free of duty in the arts and manufactures, as before.

Feeling somewhat interested in the matter, inasmuch as the doubt had arisen from a misunderstanding of some remarks of mine at a meeting of the Pharmaceutical Society in London, the report of which appeared in the March number of the Transactions of the past year, page 453, I requested the Board to favour me with a perusal of Mr. Phillips's report. My request was at once granted in the most handsome manner, and a copy furnished me, with full liberty to make such use of it as I might see proper. Finding, on its perusal, that I could not make it available without having the results of the inquiry before me, I took the further liberty of requesting to be favoured with these also, and in the same handsome manner they were at once sent me; and to this kindness of the Hon. Board, I am indebted for the privilege of reading Mr. Phillips's valuable paper, and exhibiting the results of his experiments to the present meeting.

Mr. M. here read the letters from the Board:—

"*Inland Revenue, Somerset House, London, W.C.*
"22*nd June*, 1857.

"Sir,—Having laid before the Board your letter of the 16th instant, I am directed to transmit to you the enclosed copy of the report of Mr. Phillips, to which you allude, and of which they will not object to your making such public use as you may deem advisable.

"I am, Sir, your obedient Servant,
"Thos. Dobson, *Assist. Secretary.*

"J. F. Macfarlan, Esq."

"*Inland Revenue Office, London, W.C.*
"20*th October*, 1857.

"Sir,—I am directed to acknowledge the receipt of your further letter, and to inform you that the Board have forwarded to their Collector at Edinburgh for delivery to yourself, the samples in question.

"I am, Sir, your obedient Servant,
"Thos. Dobson, *Assist. Secretary.*

"John F. Macfarlan, Esq."

COPY OF MR. PHILLIPS'S REPORT.

Honourable Sirs,—On the 5th March last, Mr. Dobson referred to me an article in the *Pharmaceutical Journal* for that month, in which it is stated that Mr. Macfarlan had manufactured, from methylated spirit, sweet spirit of nitre free from disagreeable flavour, and that he hoped to improve even upon that. Mr. Redwood observed, at the Pharmaceutical Meeting held on the 4th February last, that, if this proved to be correct, it would be unsafe to the public revenue, as "there was no difficulty in recovering good, pure, and drinkable spirit from good and pure sweet spirit of nitre." It may be observed, in the article in question, that Mr. Macfarlan states that he can manufacture, from methylated spirit, sweet spirit of nitre *free from disagreeable flavour*, not that he can produce it in a *pure* state; and he appears to admit that a certain portion of the nitrate of the oxide of methyl derived from the wood spirit must be present. On the other hand, Mr. Redwood seems to refer

* *Reports on the Successful Application of Methylated Spirit, &c. &c.* 1856.

to *pure* sweet spirit of nitre as affording a drinkable spirit, and not to that which is simply free from disagreeable flavour.

Before proceeding to describe the experiments made in the laboratory with a view to determine whether a potable spirit can be produced from methylated alcohol, either by the agency of nitric or hyponitrous acids, or by other means, it may be proper to remark that the sweet spirit of nitre of pharmacy consists of spirit of wine holding in solution hyponitrous ether ($C_4 H_5 O + NO_3$), which is a highly volatile substance, boiling at between 60° and 70° Fahr. There are various methods prescribed for the production of sweet spirit of nitre, but they all depend on the action of hyponitrous acid upon alcohol, either directly or by the agency of nitric acid. When wood spirit is treated with nitric acid, an ether is not obtained homologous to hyponitrous ether, as such is not known to exist, but an ethereal liquid is produced, containing most probably nitrate of the oxide of methyl, the characters of which, however, I have examined no further than was necessary for the object of the present inquiry.

In placing before the Board the results of my experiments, I beg respectfully to submit for inspection samples of the various products obtained, labelled and marked with letters to correspond with the descriptions given in this statement, premising that, from the tendency of sweet spirit of nitre to become acid by keeping, the samples are not so pure as when first obtained.

As a preliminary step, sweet spirit of nitre was prepared from pure spirit of wine, both by the direct action of hyponitrous acid (NO_3) and by the agency of nitric acid; the process adopted in the former being Liebig's method for obtaining pure hyponitrous ether, the formula of the London Pharmacopœia being followed in the latter. The following are the products thus obtained.

Sample A.—This and the other samples were exhibited and passed round the Meeting. Pure hyponitrous ether obtained by Liebig's process. This sample, from its extreme volatility, could not have been kept at ordinary temperatures, it is therefore dissolved in spirit of wine; so that the solution contains 20 per cent. of the ether, thus corresponding nearly in strength with the sweet spirit of nitre of pharmacy.

Sample B.—Sweet spirit of nitre obtained by distilling the dilute alcohol through which the hyponitrous acid had passed in the production of Sample A; 2560 fluid grains, having a specific gravity of 879.05, were obtained from 5000 fluid grains of alcohol, specific gravity 838.5.

Sample C.—Sweet spirit of nitre made from pure spirit of wine by the process prescribed by the London Pharmacopœia. The specific gravity of the sample is 858.35, which is much higher than that given in the Pharmacopœia; this is owing to the alcohol which distilled over, before the nitric acid began to act, having been kept separate from the sample.

Wood spirit of a specific gravity of 814.83 at 60° F. was then similarly treated, the products being—

Sample D.—Obtained in the manner that Sample B was procured; 3520 fluid grains, sp. gr. 872.10, were afforded by 5000 fluid grains of wood spirit.

Sample E.—Formed by treating wood spirit with nitric acid in the manner prescribed by the London Pharmacopœia for the production of sweet spirit of nitre.

The last two samples represent the ether derived from wood spirit by the processes followed in the production of sweet spirit of nitre. It will be observed that the taste and odour of this ether are much less disagreeable than those of the wood spirit from which it is derived, and that one part of it may be mixed with nine parts of pure sweet spirit of nitre without materially altering the flavour of the latter. Sample F is such a mixture.

Sweet spirit of nitre was next produced from methylated spirit by each of the methods above named. The specimens thus obtained are scarcely distinguishable in flavour from those formed from pure alcohol, and are exactly similar to Sample F. The following are samples:—

Sample G.—Sweet spirit of nitre produced from methylated spirit in the manner that Sample B was obtained from pure spirit of wine; 2800 fluid grains, sp. gr. 878.34, were afforded by 5000 fluid grains of methylated spirit, sp. gr. 836.5. The sample contains a large per-centage of hyponitrous ether.

Sample H.—Sweet spirit of nitre produced from methylated spirit by the process of the London Pharmacopœia. Sp. gr. of the sample 852.49.

From my experiments, and from a comparison of the above samples, I am satisfied that sweet spirit of nitre, almost free from disagreeable flavour, can be easily obtained from methylated spirit; not because the wood spirit can be separated, but owing to the fact that the derivative of that body formed by the action of the acid in the production of sweet spirit of nitre is itself comparatively free from disagreeable flavour, and in any attempt to separate alcohol from sweet spirit of nitre so made wood spirit must also be eliminated, the resulting product being methylated spirit again, and not pure spirit of wine; and I am convinced, not only from the results of this inquiry, but from numerous experiments made by me on a former occasion, that the revenue cannot be endangered by the manufacture of sweet spirit of nitre from methylated spirit, as I do not think that any method can be devised by which a potable spirit could be produced from the article so manufactured; and I am further of opinion, that if a drinkable spirit could be recovered even from pure sweet spirit of nitre, the cost of such spirit would be much greater than that of duty-paid alcohol, and that the process could not be practised for fraudulent purposes. That Mr. Macfarlan has obtained from methylated spirit sweet spirit of nitre free from disagreeable flavour is probable, but that he has succeeded in preparing it without its being contaminated by wood spirit or some of its derivatives, I do not, for the following reasons, think possible:—First. Nitric and hyponitrous acids act upon wood spirit with the same facility as upon alcohol, and the resulting compound is produced simultaneously with the sweet spirit of nitre. Second. The compound thus derived from wood spirit has a boiling point almost identical with that of sweet spirit of nitre; consequently, the separation of the two substances by distillation becomes very difficult, if not impossible.

It was observed, on treating methylated spirit with nitric acid for the purpose of obtaining sweet spirit of nitre, that, before the action of the acid upon the spirit took place, a large proportion of the alcohol had distilled over less contaminated with wood spirit than the methylated spirit operated upon, and also nearly free from hyponitrous ether. Upon this the following experiments were made:—

9390 fluid grains of methylated spirit, sp. gr. 854.1, and 2 oz. by weight of nitric acid, sp. gr. 1420, were introduced into a retort, and the mixture cohobated for a period of four hours; the liquid was then distilled slowly, the object being to distil off as much as possible before the violent action of the acid upon the alcohol commenced. The distillates obtained were as follows:—

		Fluid grains			
No. 1	amounted to	1320,	having a sp. gr. of	831.45 = 59.1	o. p.
2	"	4190,	"	832.50 = 58.6	"
3	"	1170,	"	846.05 = 51.5	"
4	"	1190,	"	874.85 = 33.4	"
5	"	330, chiefly dilute acid.			
		8200			

The first three distillates, amounting to 6680 fluid grains, were obtained before the action of the acid upon the alcohol began; the fourth distillate was sweet spirit of nitre containing a large proportion of hyponitrous ether. The following are specimens of the products:—

Sample K.—Mixture of the first three distillates obtained before the action of the acid began.

Sample L.—Sweet spirit of nitre distilled over after the nitric acid had began to act.

The Sample K is much less disagreeable to the taste and smell than methylated spirit, but it is still contaminated, and discloses an unpleasant flavour when diluted. The number of fluid grains, at proof, contained in the first three distillates was 10,518, and the fluid grains at proof of spirit of wine used in the experiments were 13,141, showing that 80 per cent. of spirit in the state represented by Sample K had been recovered. The experiment was repeated several times with nearly the same results.

The following attempt was made to remove the disagreeable flavour still remaining in the first three distillates. For this purpose they were mixed, half of their bulk of water added, and the liquid then distilled, the distillates being collected in two portions. The first portion (Sample M) consisted of 1520 fluid grains, having

a specific gravity of 854.10, and contained a considerable quantity of hyponitrous ether. The second portion (Sample N) amounted to 5010 fluid grains, sp. gr. 867.75: this portion is less contaminated than Sample K, but still possesses a disagreeable flavour derived from wood spirit. When the inferior quality of Sample N is considered in conjunction with the cost of its preparation and the loss of spirit, amounting to 48 per cent., incurred in its production, it will, I think, become apparent, that, even if it be deemed a potable spirit, it cannot be manufactured so as to compete in price with duty-paid alcohol; and the same remarks will, I believe, be found applicable to all other modes of procuring a potable spirit from a mixture of alcohol and wood spirit.

Other experiments have been made. The following are samples of the products; none of which, however, are so free from disagreeable flavour as Samples K and N.

Sample O.—Spirit (of which Sample N is a specimen) allowed to stand several hours over quicklime, and then distilled.

Sample P.—Same spirit distilled over quicklime, then treated with potash, and redistilled. This sample contains ammonia.

Sample R.—Methylated spirit distilled after having been in contact with chloride of calcium for a period of twenty hours.

Sample S.—Methylated spirit treated with hydrochloric acid, and then distilled.

Sample T.—Methylated spirit distilled after having been in contact with *vegetable* charcoal for a period of nine days.

Sample U.—Methylated spirit distilled after having been in contact with *animal* charcoal for a period of nine days.

For the purpose of comparison, I also beg to submit samples of pure spirit of wine, wood spirit, and methylated spirit.

The subject of this report is one which has long occupied my attention, and the experiments now recorded are partly supplemental to numerous others made by me on previous occasions with the same object. I have for many years been in the habit of using alcohol for laboratory purposes, and have always found that, when it was once impregnated with another volatile organic body, its pure flavour was extremely difficult to restore; most probably owing to the great power which alcohol has of dissolving and retaining those subtile and hitherto imponderable matters to which many substances owe their characteristic flavour, and of which but little as yet is known. It may be possible that, as a laboratory experiment and irrespective of expense, alcohol which is pure to all the tests of chemistry may be obtained from methylated spirit; but I know from experience that the senses of taste and smell are far more effective than such tests in detecting the minute yet disagreeable contaminations in question, for a specimen of alcohol may, as far as we have the means of determining, have the true boiling point and specific gravity, and when analyzed may yield the exact proportions of carbon, hydrogen, and oxygen, and yet to the senses be palpably impure, and therefore unsaleable as a drinkable spirit.

I am, &c.

(Signed) G. Phillips, S. G. Exr.

Having thus given the detail of Mr. Phillips's experiments, the Members will at once see that these results, while they agree with those obtained by Drs. Graham, Hofmann, and Redwood, correspond entirely with the remarks contained in a paper I had the honour of reading before this Society in January last, and which appeared in the February number of the Journal, and which I refer to now only for the purpose of showing that I never imagined, far less asserted, that in the preparation of the sweet spirit of nitre exhibited on that occasion, the composition of the methylated spirit was entirely subverted, and the sweet spirit obtained free from all contamination of the methyl. On the contrary, holding then the same opinion as Mr. Phillips has now expressed, I remarked:—"In preparing sweet spirit of nitre from the methylated spirit, the same method may be adopted as in preparing it from pure alcohol; and if we suppose the action of the nitric acid to be equally powerful on both its ingredients—the alcohol, the Ae O HO, and the pyroxylic spirit, the Me O HO, then we may expect the resulting compound to contain the respective ethers very much in the proportion in which the respective alcohols exist in the methylated spirit." * And such unquestionably is the case; the ether is free from disagreeable flavour, but necessarily contains an admixture of the nitrate

* *Pharmaceutical Journal*, vol. xvi., p. 410.

of oxide of methyl with the hyponitrate of oxide of ethyl ; and it is gratifying to me to find my opinion confirmed by so distinguished an authority.

Mr. M. exhibited specimens of sweet spirit of nitre prepared from pure alcohol and from methylated spirit, to show the slight difference in flavour between them. The case is exactly the same with sulphuric ether made from the methylated spirit. Both the alcohols are acted upon, and the resulting compound is a mixture of their respective ethers. It is otherwise with chloroform. In this preparation the methylated spirit is entirely converted into the new compound, and hence can no longer be recognized. The flavour, action, and effects are exactly the same as those of chloroform prepared from pure spirit of wine. In the paper already referred to, and which was read before this Society in January last, I gave an account of some experiments made by a committee of the Royal Medical Society, which satisfactorily established this point ;* and I have now the pleasure of exhibiting the remaining portions of the chloroforms employed on that occasion, which, being nearly two years ago, attest that the one is as permanent in its character as the other, both being as fresh as at first. Mr. M. here exhibited these, which were passed round the meeting. Chloroform is, however, subject occasionally to a species of decomposition, not yet fully investigated, by which acid properties are developed. But this applies equally to that prepared from pure alcohol and from methylated spirit ; and generally, when it does occur, is easily corrected, by letting it stand for a few hours on the carbonates of soda or potass, and then pouring it off.

Other questions have lately arisen in regard to the use of methylated spirit in medical preparations, as tinctures, &c. ; but this I do not enter upon, and only express my hope that when the methylated spirit has had a fair trial, "the permission to use pure spirit of wine" for purposes so essential to the health and comfort of the community, and for which methylated spirit has been declared by the highest authority unsuitable, may be found both practicable and safe.

The Chairman observed that the result of Mr. Macfarlan's remarks was satisfactory, tending to the conclusion that the object of the Board of Inland Revenue in permitting the use of methylated spirit duty free, had not been frustrated, which would have been the case, if the spirit could have been deprived of its nauseous flavour and made palatable. He then introduced to the meeting the subject of the

SALE OF POISONS BILL.

In the first place, it was proper to advert to the last section of the House of Lords' Bill, namely, "This Act shall extend only to England," for if that section were to stand, it might be asked, what had they in Scotland to do with it? But that was merely an expedient like one adopted occasionally by a dentist when he had a very awkward tooth to deal with which he could not extract at once, but by splitting it in two he removed with comparative ease one half at a time. They would not be led astray by any such artifice, for they might be sure that if the Poison Bill were to pass with reference to England, it would be followed by a short Act simply extending its operation to Scotland. Supposing it to be a bad Bill, they ought to unite in opposing it, and if a good Bill, North Britain was entitled to share the advantage. Whatever law might be good for one half of Great Britain was equally so for the other. The Pharmaceutical Society had always advocated judicious legislation on the sale of poisons and medicines generally, but maintained that, unless judicious, and in the right direction, legislation was likely to increase the evil by directing attention to the subject, and also by removing the existing responsibility from the vendors of drugs. The Bill emanating from the House of Lords had been maturely considered by the Council of the Society, and an extensive correspondence with the Members had taken place. The result was, that out of about 2000 who had been communicated with, only ten expressed approval of the Bill in its present state, and the ground of approval was simply that it removed responsibility from the Chemist. He (the Chairman) thought it was not desirable to remove such responsibility. The vendors of strong and dangerous substances ought to be fully aware of the risk attending their use, and no Act of Parliament could define the precautions which the experience of a qualified Chemist would suggest in each case as it might arise, and also in the general management of his business.

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* *Pharmaceutical Journal*, vol. xvi., p. 408.

The Committee appointed by the Council specially to consider this question had very carefully revised the "Sale of Poisons Bill," and had endeavoured, by expunging some portions and amending others, to reduce it to a form in which it might be less objectionable, and at the same time more likely to effect the desired object. The Society having been unjustly accused of obstructing legislation because they had pointed out certain objectionable provisions in Bills prepared by parties not practically conversant with the subject, it was the object of the Committee, while opposing the "Sale of Poisons Bill," to be prepared with the principles of a measure such as the Society could with propriety recommend and support. He held in his hand a rough draft of the Bill so altered, but was not authorized to submit it to the meeting as the final result of the deliberations of the Committee, which would further consider its details before deciding upon a report. He would, however, take the opportunity of stating in general terms the nature and tendency of the proposed amendments, with a view of taking the sense of the meeting, and receiving any suggestions that might be offered for the consideration of the Committee. He then proceeded to notice *seriatim* the sections of the Bill, pointing out the provisions which were objected to—such as the attempt to distinguish poisons by means of triangular bottles, gutta percha, and tinfoil; the colouring of poisons (with the exception of arsenic); the introduction in the schedule of some medicines so constantly in use, as to frustrate the object of the regulations; the proposed isolation of a small number of poisons, from a fallacious notion of security, while other poisons, not recognized as such by Act of Parliament, might be arranged at random among innocuous substances; and objection was especially urged against the construction of the proposed new Board of Examiners, which, besides being unnecessary, would clash with, and ultimately supersede the Examiners appointed under the 15 and 16 Vict., cap. 56, who were fully competent efficiently to carry out all the duties required by the proposed Act.

Mr. Macfarlan supported the view of the question as stated by the Chairman, observing that the Sale of Poisons Bill, by attempting too much, was calculated to defeat the object intended, as any law which could not be practically enforced, and uniformly acted upon, must of necessity be thrown into contempt, and by directing attention to the subject, without affording a remedy, it would rather assist than restrain the criminal, while no precautions which could be defined in an Act of Parliament, would supersede the necessity for a proper qualification in the vendor of medicine, to which latter object he thought the aim of the Legislature should be chiefly directed.

Mr. Flockhart said he had listened attentively to the remarks of the Chairman on the proposed amendments to the Bill, and he thought the Bill, as so amended, would meet the requirements of the case, and leave little or nothing to be desired.

Mr. Brown did not agree in opinion with any of the previous speakers. He objected to legislation altogether. The result of prohibiting such poisons as arsenic and strychnia, the nature of which was well known, would be that the criminal would resort to other poisons less easily detected, and so baffle the efforts of the Analytical Chemist; and the advancement of science did not keep pace with the progress of crime. No law could prevent suicide, and the attempt to do that which every one must know to be impossible, was a palpable absurdity. He considered the intelligence and common sense of the Chemist the best protection the public could have. He was on principle a free-trader; and differed from the Chairman in reference to the meaning of the term "responsibility." He considered the Chemist was morally responsible, and that this was quite distinct from and far more desirable and effectual than any legal responsibility which could be imposed by an Act of Parliament.

The Chairman explained that this was precisely the sense in which he had used the term, and he maintained that the responsibility now resting on the Chemist was a *moral* responsibility, and that the substitution of a *legal* responsibility, founded on a few arbitrary distinctions, and the arrangement of shop-bottles according to Act of Parliament, would afford no additional security to the public, but quite the reverse.

It appeared to be the general opinion of the meeting, that the Sale of Poisons Bill might be so modified and amended as to be beneficial and free from objection; and while a few of those present sympathized with the free-trade notions of Mr. Brown,

it was obvious that a large majority were favourable to the broad principles of the Bill as proposed to be amended.

After a vote of thanks to the Chairman, the meeting separated at a late hour.

PHYTOLOGICAL SOCIETY.

17, *Bloomsbury Square.*

The Fifth General Annual Meeting was held on Wednesday, January 13, 1858,

ROBERT BENTLEY, F.L.S., PRESIDENT, IN THE CHAIR.

The following Report of the Committee was read:—

The Committee of Management, in presenting their Fifth Annual Report to the Members of the Phytological Club, think the occasion a suitable one for referring to the objects for which the Club was instituted, and briefly reviewing the results of its labours.

The Phytological Club was originated in 1852, for the purpose of rendering mutual assistance in botanical pursuits to persons connected with the profession of Pharmacy. It was proposed to effect this object by the following means:—The formation of an herbarium of reference — the exchange of specimens between Members—the collection of facts relating to the popular uses of indigenous plants—and correspondence with botanists in other countries when opportunities offer.

Since that time the Club has been gradually progressing. It now numbers upwards of ninety Members, and has collected a valuable herbarium of reference, which now includes upwards of 800 species, of which 155 have been added during the past year, and may be consulted by Members on application to the officers of the Club.

The exchange of specimens has also been kept steadily in view by the Committee, and although presenting some difficulty, from the labour it involved to the Curators, 680 plants have been distributed amongst the Members since the formation of the Club, and the present stock of duplicates is in course of arrangement for the same purpose.

Monthly meetings have been regularly held during the last year; and, although some interesting communications have been read, the Committee cannot but regret that the number has been too limited to carry on the proceedings with all the spirit desirable. The Committee would on this occasion, therefore, direct attention to one of the original objects of the Club—namely, "The collection of facts relating to the popular uses of indigenous plants," as likely to yield abundance of interesting matter.*

One botanical excursion took place during the last summer, and it is the intention of the Committee to arrange for one or more during the coming season.

The Treasurer's Report showed a balance in hand of £12 6*s.* 9*d.*

It was proposed by Mr. GRIFFITHS, seconded by Mr. GROVES, and resolved, "That the Report of the Committee be adopted."

The following officers were then elected for the ensuing year:—

President, Robert Bentley, F.L.S.; Vice-Presidents, Jacob Bell, F.L.S.; Henry Deane, F.L.S.; T. N. R. Morson, F.L.S.; T. Redwood, Ph.D.; P. Squire, M.R.I.; Treasurer, Daniel Hanbury, F.L.S.; Curators, Mr. J. C. Braithwaite and Mr. Schweitzer; other Members of Committee, Mr. Blyth, Mr. Grundy, Mr. Greenish, Mr. Groves, Mr. Sharpe, Mr. Tupholme; C. Wood, Hon. Secretary.

It was proposed by Mr. BRAITHWAITE, seconded by Mr. WOOD, and resolved, "That the name of Phytological Club be changed to Phytological Society."

The thanks of the Club were then voted to the Council of the Pharmaceutical Society for the use of their rooms, and to the Editor of the *Pharmaceutical Journal*, for the insertion of the reports of the meetings.

Mr. D. HANBURY read some observations on the glands of the capsules of *Rottlera tinctoria*, Roxb., a tree of the Nat. Ord. *Euphorbiaceæ*, common in many parts of India, and exhibited specimens under the microscope.

* Such communications not being necessarily for publication.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The usual fortnightly meeting of this Association was held on Thursday evening, January 14th, at the Royal Institution, Colquitt Street,

THE PRESIDENT, MR. H. SUGDEN EVANS, IN THE CHAIR.

Mr. Thomas Green, Edge-hill, was elected a Member.

Professor T. C. Archer exhibited an interesting specimen of the leaves of an orchidaceous plant, which had been received from Manilla. They possessed powerfully the odour of Tonquin beans, and were valuable as preservatives against moths. In Manilla they were used by the natives as a substitute for tea, under the name "Faham."

Professor Archer then delivered the lecture of the evening, on

THE BEAUTIES OF STRUCTURE IN THE VEGETABLE KINGDOM.

He commenced by referring to the vague notions of a plant possessed by those who had paid no attention to the subject. A philosophical view of the vegetable structure would readily show that the larger parts were but complications of smaller ones, each of which, under some circumstances, constitutes a plant itself. When comparing a wax flower with a natural one, it was often said that the representation was better than the model; but, if they examined the texture, they would at once see an enormous difference, there being in the real flower a complicated arrangement of cells, each of which had its particular share of work to perform, and collectively built up the plant in that form which served to indicate its species. The lecturer then, by the aid of a beautiful collection of diagrams, explained the action of the seed, or productive body, and gave a lucid description of the various stages and incidents in the growth of the plant, taking occasion to mention the important discovery of Professor Gasparini, which establishes the disputed fact of vegetable excretion, and proves that absorption by the root takes place, not, as has hitherto been believed, through the spongioles, or delicate cellular extremities of the roots, which are, in fact, covered by a protective membrane, but through delicate capillary hairs situated immediately above them.

Having noticed the various parts which constitute the plant, he mentioned some peculiarities of those parts, and then related the peculiarities of several species. In conclusion, he recommended those of his hearers who felt inclined to study botany not to take up a botanical treatise and worry themselves with the hard names, but to learn something of the beautiful contrivances of nature for carrying out certain operations. They would then find a charm in the study; and if they commenced their studies with the illustrations of the science, they would get a knowledge of it before they were aware of it themselves.

At the conclusion of the lecture the members warmly applauded Professor Archer, and passed unanimously a vote of thanks proposed by Mr. Abraham. The proceedings then terminated.

ORIGINAL AND EXTRACTED ARTICLES.

ON A SIMPLE METHOD OF DEODORIZING IMPURE HYDROGEN AND CARBONIC ACID GASES.

BY JOHN STENHOUSE, LL.D., F.R.S.

When hydrogen gas is prepared by acting with dilute sulphuric or hydrochloric acids upon commercial zinc, it has always a slightly disagreeable odour, arising, as is well known, from the presence of a small quantity of a liquid hydrocarbon, resembling impure naphtha in its properties. The hydrogen gas made with malleable iron has a still more disagreeable odour, arising from larger quantities of a similar hydrocarbon, together with traces of sulphuretted, phosphoretted, and sometimes even of arsenuretted hydrogen. So offensive is this odour, that hydrogen gas is very seldom prepared from malleable iron, and almost

never from cast iron, which yields still more of these impurities, though both malleable and cast iron are immensely cheaper sources of hydrogen than zinc. Scraps of malleable iron, from their more ready solubility in acids, are better adapted for preparing hydrogen gas than cast iron. By the following simple arrangement, however, of passing the impure hydrogen through a short column of coarsely-powdered charcoal, or, in other words, through a charcoal air-filter, the hydrogen from either malleable or cast iron is rendered perfectly odourless, the whole of the impurities present being absorbed and retained by the charcoal. To effect this, I take a tube, either of glass or tin-plate, about an inch and a quarter in diameter and from eight to ten inches in length; this I fill with bits of wood charcoal about the size of peas or beans: the charcoal is packed loosely into the tube, so as to present no perceptible obstruction to the passage of the gas: the charcoal is placed between the wash-bottle and the eduction tube. The charcoal column just described is large enough for laboratory use; but when hydrogen is manufactured on the great scale, a larger amount of charcoal becomes necessary. In this way I have obtained, as already stated, a pure and perfectly odourless hydrogen from both malleable and cast iron; and the charcoal has remained as effective as at first, though in daily use for several weeks. The efficiency of the charcoal can always be restored by simply heating it to redness in close vessels.

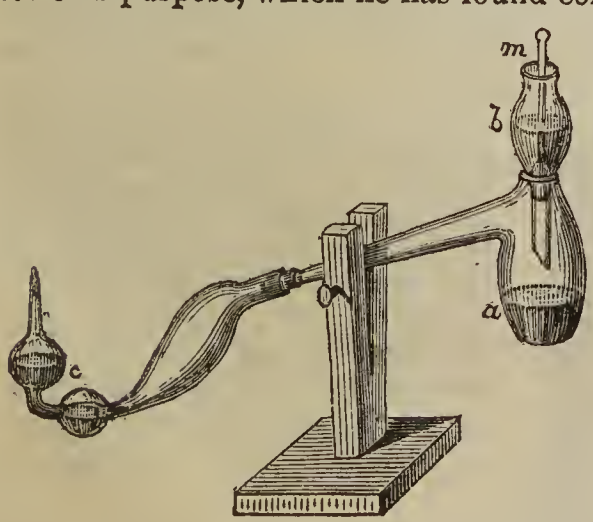
Carbonic acid, as is well known, is usually prepared for the manufacture of aerated waters, by acting upon chalk or powdered limestone by means of dilute sulphuric acid. The gas obtained in this way has invariably an offensive odour, which communicates a disagreeable taste to the aerated waters. So much is this the case, that many manufacturers obtain the gas, for the superior kinds of soda water, by decomposing bicarbonate of soda by sulphuric acid. This expensive process, however, is altogether unnecessary, for by passing the impure carbonic acid through such a column of charcoal as that described above, I have obtained a perfectly inodorous carbonic acid, both from chalk and impure limestones, containing much bituminous matter.

REPORT OF THE
RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,
AND OF THE
APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

BY B. H. PAUL, Ph.D.

(*Continued from p.* 381.)

Apparatus for Estimating Ammonia.—Hr. Scheibler* describes an apparatus for this purpose, which he has found convenient. It consists, as shown in the woodcut, of a retort *a*, into the tubulure of which fits a stoppered funnel, *b*, for holding solution of potash. To the beak of the retort is attached an ordinary hydrochloric acid bulbed tube, *c*. The substance in which ammonia is to be estimated is introduced into the retort, and when the whole is arranged, the stopper of the funnel is raised, so as to allow some solution of potass to pass into the retort. This is repeated gradually as the absorption of ammonia takes place in the hydrochloric acid tube, and when sufficient potash has been added, the liquid in the retort is boiled until the whole of the ammonia is expelled.



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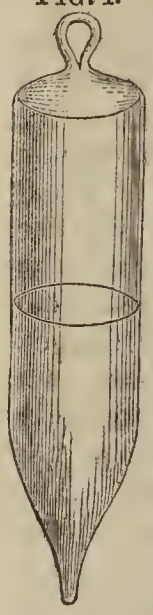
* *Journal für Praktische Chemie*, lxxi., 249.

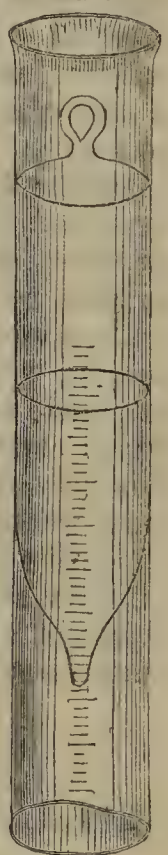
Improved Apparatus for Volumetric Analysis.—Prof. Erdmann* recommends the use of a float for the purpose of facilitating the reading off of the volume of liquid in a Mohr's burette, and thus rendering the estimation more exact. The float is a hollow glass tube of the shape represented by fig. 1, and of such diameter as to move freely in the burette as the liquid flows out, and when pushed down into the liquid to rise again exactly to its original position. The specific gravity of the float is so adjusted, by enclosing within it a little mercury, that when immersed in the filled burette, as shown in fig. 2, the upper edge of the liquid may cut it uniformly on all sides. It is essential also that the axis of the float should exactly coincide with that of the burette, in order that the line marked round the middle of it may be always parallel to the graduation of the burette.

Fig. 1.



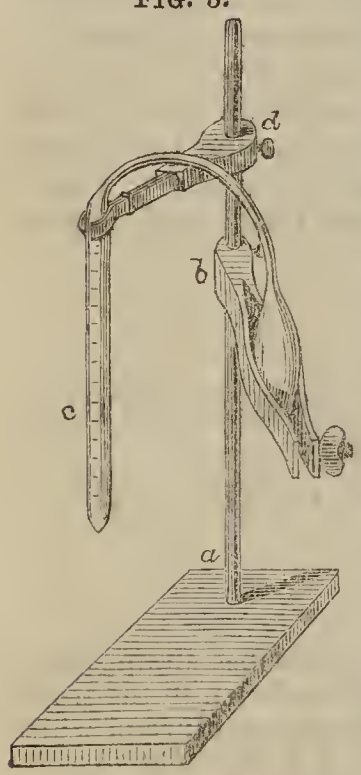
In using this float it is immersed in the filled burette, the cork opened, and enough liquid allowed to escape for the mark on the float to correspond exactly with the zero of the graduation. In the subsequent observation, the volume of liquid used is indicated by the degree with which the mark on the float coincides.

Fig. 2.



For the purpose of using Mohr's burette with liquids which, like permanganate of potash, are decomposed by the caoutchouc of the pressure cock, Hr. Scheibler† suggests the arrangement represented by fig. 3, in which the filling of the burette and the discharge of the liquid in an experiment is effected by the expansion or compression of a caoutchouc ball *e*, partly filled with air, and connected with the burette tube *c*, by a caoutchouc tube which fits upon the upper contracted end. The caoutchouc ball is fitted into an ordinary retort holder that can be closed or opened by means of a screw. The use of this instrument is almost obvious; to fill the pipette the caoutchouc ball is compressed by tightening the screw; the beak of the pipette is then immersed in the liquid with which it is to be filled, and the requisite quantity drawn up by loosening the screw. The liquid is discharged from the pipette into the vessel intended for it by again tightening the screw gradually.

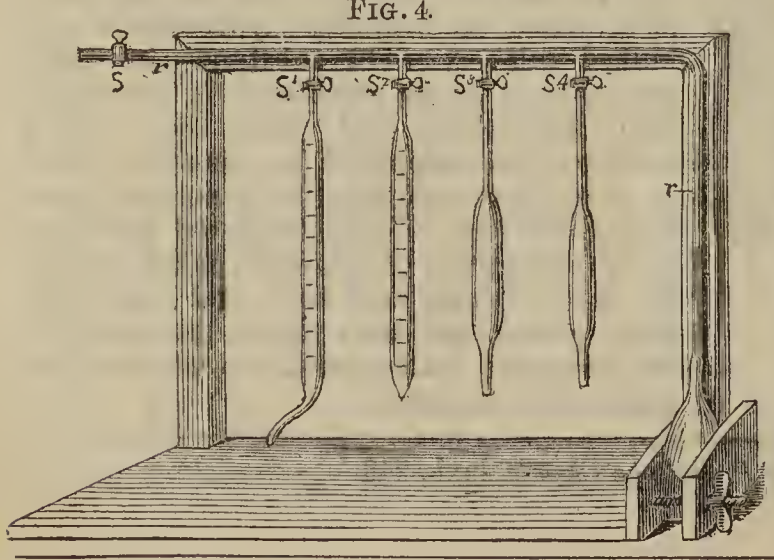
Fig. 3.



With pipettes of more than thirty or fifty cub. cent. capacity, it is necessary, in order to work them in this way, to have the aperture of the spout very much contracted, so as to prevent the liquid from flowing out before it is required.

For a certain class of purposes, where numerous estimations have to be made frequently, this apparatus may be arranged on a more extended scale, as shown in fig. 4, and communication may be made between any one or more of the pipettes and the caoutchouc ball by means of the cocks S^1, S^2, &c.

Fig. 4.



This arrangement may also be employed for measuring a number of successive definite volumes of a volumetric reagent, by having another cock at *r*, and the cocks to the pipettes furnished with valves for admitting air, the tube *S* being connected with a large reservoir containing a normal test solution.

* *Journal für Praktische Chemie*, lxxi., 193. † *Ibid.*, lxxi., 245.

Allotropic Modifications of Sulphur.—Prof. Mitscherlich* found that when sulphur is heated with fat or oil, to such a degree as to become viscous, it acquires a more or less intense red colour. He ascribes this to the production of a compound of sulphur with the fat, which, dissolving in the liquid sulphur, communicates to it the red colour. The proportion of fat requisite to produce this coloration is very small. When sulphur mixed with two per mille of fat is heated to the boiling point, and then poured into cold water, the mass appears quite black. Very thin fragments are translucent, and of a ruby-red colour. Sulphur melted in the same manner with 0.33 per mille of fat, and allowed to cool slowly, gives transparent prismatic crystals, which are coloured ruby-red by the admixture of the red compound. When the mass is suddenly cooled, a dark ruby-coloured, tough mass is obtained. Even the minute quantity of fat communicated to sulphur by the fingers is sufficient to cause a certain degree of coloration, when the sulphur is heated to the boiling point.

Sulphur that is perfectly free from grease does not undergo any change of colour when heated to the boiling point repeatedly; and, when poured into cold water, gives tough sulphur of a citron-yellow colour by reflected light. Thin fragments seen by transmitted light (between glass plates), appear greenish yellow.

The coloured substance dissolves partially in bisulphide of carbon, communicating a red colour to the solution, and to some parts of the sulphur crystals obtained from it. When sulphur coloured in this way is distilled, a very inconsiderable carbonaceous residue is left in the retort. The coloured substance is not decomposed at the boiling point of sulphur, but it does not distil over.

Prof. Mitscherlich regards this red or black sulphur, not as an allotropic modification of sulphur, but merely as sulphur coloured more or less by the above-mentioned compound of sulphur with fat.

These results were confirmed by Prof. Magnus,† who also found that a number of other substances besides fat, determine this coloration of sulphur. For example, stearic acid, paraffin, wax, spermaceti, ozokorite, colophony, mastic, gutta percha, caoutchouc, also succinic acid, sugar, starch, cotton, &c. The latter named substances produce the coloration only at a temperature of 572° F.

Sulphur melted at 662° F., when it passes from the viscous into the liquid state, and slowly cooled, is completely soluble in bisulphide of carbon, but sulphur heated to 572° F. and then rapidly cooled, is only partially (about 60 per cent.) soluble in bisulphide of carbon. This soluble portion Prof. Magnus believes to consist of two different modifications of sulphur. By distilling off successive portions of the bisulphide, rhombodric crystals of sulphur are first obtained, and finally there remains a tough mass, that may be drawn into threads, and when the bisulphide has completely evaporated, becomes friable. This friable sulphur cannot again be dissolved in bisulphide of carbon, and any remaining admixture of rhombic sulphur may then be separated from it. When the soft sulphur has been heated only once to 572 F., and is perfectly free from grease, the friable residue is pure yellow; but when grease is present it has a red colour, and hence it was described by Prof. Magnus as red sulphur. With regard to its insolubility after once being separated from solution, it resembles silica. By melting and cooling slowly this friable sulphur is converted into ordinary soluble sulphur.

Prof. Magnus considers it probable that the peculiar character of soft sulphur is owing to the presence of this friable sulphur, more especially since the admixture, in very small proportions, of other substances, determines a similar alteration. Thus, when sulphur is heated to 572° F. with 0.3 per mille paraffin, and then suddenly cooled in water, it remains soft and doughy for a long time. In the liquid state also it presents characters different from those of pure sulphur, inasmuch as it becomes much less viscous at a high temperature.

Prof. Magnus considers that there are five allotropic modifications of sulphur: —

1. Prismatic sulphur } both soluble in bisulphide of carbon
2. Octohedral or rhombic sulphur }
3. Insoluble sulphur
4. Friable sulphur
5. Black sulphur

M. Berthelot is of opinion that the various modifications of sulphur may be

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* *Journal für Prakt. Chemie*, lxvii., 369. † *Ann. der Physik und Chemie*, xcix., 145.

referred to two which are more essentially distinct, and which possess a greater degree of persistence than the others, viz. :—

1. Octohedral sulphur—electronegative.
2. Amorphous sulphur—electropositive.

He considers, moreover, that there is a constant relation between these two modifications and the nature of the various compounds of sulphur; that in their chemical relations the former is analogous to oxygen, and the latter to the metals, hydrogen, &c.

He considers that the former modification comprises prismatic sulphur and the sulphur separated from polysulphides, since both of these are spontaneously converted into octahedral sulphur, and all three are soluble in bisulphide of carbon, alcohol, ether, &c.

The electropositive sulphur comprises that separated from the compounds of sulphur with oxygen, chlorine, or bromine. It is amorphous, and insoluble in bisulphide of carbon. The sulphur from the chloride and bromide is the most persistent. There are also three other less stable modifications of electropositive sulphur, viz. :—

a. Sulphur obtained from hyposulphites. This is soluble in bisulphide of carbon, but becomes insoluble when once separated from solution. The soft sulphur obtained by the influence of heat, and that produced by the mixture of a sulphide and a hyposulphite, may be regarded as mixtures of both kinds of sulphur.

b. Insoluble sulphur obtained as a residue when sulphur rendered soft by the influence of heat, is exhausted with bisulphide of carbon. This is the least stable of the modifications of sulphur; when boiled for a few minutes with alcohol it is almost entirely converted into crystalline sulphur, soluble in bisulphide of carbon.

c. Insoluble sulphur obtained by exhausting flowers of sulphur alternately with alcohol and bisulphide of carbon.

The colour of these several kinds of sulphur varies from lemon-yellow to dark red. M. Berthelot considers that it depends upon the conditions under which they are produced, and that it is frequently owing to the presence of a trace of foreign substance. This appears probable from the above-mentioned observation of Professors Mitscherlich and Magnus.

These kinds of sulphur differ in the degree of facility with which they may be converted into soluble and crystalline sulphur, either by the influence of a temperature of 212° F., or at the ordinary temperature by contact with certain substances, such as alkalies, or their sulphites, sulphuretted hydrogen, and alcohol.

All these kinds of amorphous sulphur may be converted into the most stable fundamental modification, by bringing them in contact with chloride of sulphur, bromide of sulphur, iodine, and also to a certain extent even by fuming nitric acid.

On the other hand, these kinds of sulphur may be wholly converted into octohedral sulphur by repeated fusion or sublimation; by solution in an alkali or alkaline sulphide, and precipitation; or by contact with potash solution for some weeks at the ordinary temperature. The prismatic sulphur seems, in certain cases, to be an intermediate stage of this conversion.

With regard to the relation between these modifications of sulphur and the various compounds of sulphur, M. Berthelot ascertained, in the first instance, that the modification of the sulphur separated from any compound, is independent of the nature of the substance employed for separating it, provided that substance is not alkaline or oxidant, and provided it effects the separation rapidly and without sensible evolution of heat. On the other hand, the particular modification of sulphur separated from a compound, is independent of the condition of the sulphur with which that compound was prepared. M. Berthelot has combined sulphur, in its several modifications, with potash, alkaline sulphides, anhydrous sulphuric acid, sulphite of soda, bisulphite of potash, bromine, and iodine. The sulphur separated from each of these compounds presented the same characters, whatever might have been the character of the sulphur employed in preparing them.

The circumstances under which sulphur was eliminated were as follow:—

1. Sulphur obtained by electrolysis.—When a water solution of sulphuretted hydrogen is decomposed by the electric current, the sulphur eliminated at the positive pole is soluble in bisulphide of carbon, and crystallizable. By the electrolysis of a water solution of sulphurous acid and sulphuric acid, amorphous sulphur, insoluble in bisulphide of carbon, is obtained at the negative pole.

2. Sulphur obtained by the decomposition of a sulphite compound.—The sulphur separated in the spontaneous decomposition of polyhydrosulphides and polysulphide of calcium, is completely soluble in bisulphide of carbon, and crystallizable in octahedrous. This is also the case with the sulphur separated in the decomposition of pure polysulphides of sodium or ammonium by means of an acid. In all these compounds the sulphur is the electronegative constituent.

On the other hand, amorphous insoluble sulphur is obtained when hyposulphite of soda, trithionate of potash, pentathionic acid, chloride of sulphur, chloro-sulphide of carbon, bromide of sulphur, or iodide of sulphur, are decomposed by water or by hydrochloric acid. In all these compounds the sulphur is the electropositive constituent.

3. Sulphur eliminated by the mutual decomposition of sulphuretted hydrogen and sulphuric or sulphurous acid. This sulphur is similar to that from the decomposition of the thionic compounds and of chloride of sulphur.

4. Sulphur separated under the influence of oxidizing conditions.—When sulphuretted hydrogen or bisulphide of carbon is burnt in such a way that only a partial combustion takes place, amorphous insoluble sulphur is eliminated. Any sulphur compound, capable of yielding sulphur—thionic compounds, sulphuretted hydrogen, polysulphide of hydrogen, or ammonium, sulphides of arsenic, copper, &c.—yield the most stable modification of amorphous sulphur when heated with fuming nitric acid. Amorphous sulphur is also produced by the action of sulphuretted hydrogen upon sulphate of iron, or upon a mixture of bichromate of potash and sulphuric acid.

The production of electropositive sulphur under the influence of oxidizing conditions, is remarkable. It shows that the sulphur, at the moment of liberation, assumes that condition which it has in the oxidized compounds, to the production of which there is a tendency.

These facts are quite consistent with the various instances of contact action already referred to. In fact, all kinds of amorphous sulphur are converted by contact with chloride of sulphur, bromide of sulphur, iodine, and nitric acid, into the most stable modification, viz., the same as that which would appear to exist in the chloride and bromide of sulphur as well as in sulphuric acid.

Under the influence of alkalies, alkaline sulphides, or sulphuretted hydrogen—substances in which sulphur is an electronegative constituent, or with which it would combine as such—the several kinds of amorphous sulphur are, on the contrary, converted into the condition of octohedral sulphur. It is interesting to remark this connexion between contact action and the electric conditions of a substance. It is already known that ozone, or electrized oxygen, is in like manner produced by contact with phosphorus or other oxidizable substances. In all the above-mentioned cases, the altered substance and that which causes the alteration, appear to assume opposite electrical conditions, in virtue of the chemical action which they tend to produce, and hence probably arises the alteration, by contact, of oxygen and of sulphur.

The significance of these phenomena is increased by considerations relating to the unequal degree of facility with which the several kinds of sulphur combine with metals and with other substances. Thus the electropositive sulphur dissolves readily in bisulphite of potash, while the octahedral or electronegative sulphur is dissolved very slowly and in very small amount. The compound, to the production of which there is a tendency, is trithionate of potash, which corresponds with electropositive sulphur. All these point to one and the same conclusion, viz., that there is a connexion between the condition of free sulphur and the part which it acts in its compounds. They furnish another instance of the connexion between chemical and electric phenomena. They show that an elementary substance can, under the influence of electrical action, at the moment of its liberation, assume various persistent conditions.

By no means less remarkable is the analogy between the persistent conditions which sulphur assumes under the influence of heat, and those which it assumes when liberated under the influence of electrical action. It points to another connexion between the two classes of phenomena; and is the more important, since it obtains also in the case of other elementary substances, for instance, selenium, and probably also phosphorus.

The characters in which sulphur resembles selenium are well known. These two

substances give rise to compounds that are very analogous, and frequently isomorphous. This resemblance extends even to the modifications which selenium undergoes by the influence of heat. Thus there is crystallizable and amorphous selenium, the one soluble in bisulphide of carbon, the other insoluble. Further, the selenium separated from its compounds, has not in all cases the same characters—that obtained from alkaline selenides is crystallizable; that obtained from selenous acid, amorphous and vitreous. M. Berthelot has also ascertained that the selenium obtained by the electrolysis of selenietted hydrogen, at the positive pole, is almost entirely soluble in bisulphide of carbon; while that obtained by the electrolysis of selenous acid, at the negative pole, is mostly insoluble. The portion dissolved becomes insoluble when the solution is evaporated to dryness, like the sulphur obtained from hyposulphites.

The modifications of phosphorus produced under the influence of heat, are also analogous to those of sulphur. Unfortunately, phosphorus cannot be separated by electrolysis from the compounds, in which it acts an opposite part; but it must be remembered that the red phosphorus may be produced by the influence of iodine, bromine, or chlorine; and that it is produced also by the reaction of phosphoretted hydrogen with chloride of phosphorus, and by the imperfect combustion of phosphorus or of phosphuretted hydrogen. These conditions are quite analogous to those in which amorphous electropositive sulphur is produced. It may be also noticed that the heat evolved in the combustion of red phosphorus and of amorphous sulphur, is in both cases less than that evolved in the combustion of white phosphorus and octohedral sulphur.

In conclusion, M. Berthelot points out that crystallized carbon becomes amorphous under the influence of the electric spark, and that the carbon separated from carburet of iron is crystalline, and suggests that these phenomena are to a certain extent analogous to those above described.

He has also specially studied the alteration which sulphur undergoes by the action of heat,* with a view to ascertaining to what extent the phenomena observed in sulphur, might be connected with the production of the insoluble modification of sulphur, and also whether it were possible to connect them with those presented in its production in the wet way. This investigation seemed more desirable from the fact that the insoluble modification of sulphur differs from soft sulphur in regard to its persistence at the ordinary temperature; and in presenting very different relations to octohedral sulphur in respect to the amount of heat which it generates.

He found that sulphur heated to 266° or 286° F., and then suddenly cooled, is completely soluble in bisulphide of carbon, and may be crystallized. When the sulphur is heated to 311° F. before being cooled suddenly, a small proportion of insoluble sulphur is produced. At 338° F., more insoluble sulphur is produced. The bisulphide of carbon solution leaves, on evaporation, crystalline sulphur and traces of sulphur that has become insoluble. At the temperatures of 365°, 401°, 422°.6, 446°, and 482° F., proportionately larger quantities of insoluble sulphur are produced. Under circumstances otherwise similar, the amount of insoluble sulphur produced at 338°, 365°, 401°, and 446° F., was in each case almost the same. MM. Deville, Schrötter, and Magnus have already shown that the production of insoluble sulphur extends to temperatures of 572° and 676° F. It appears, therefore, to be at about 338° F. that this peculiar modification of sulphur is chiefly produced. It is precisely at this temperature that, according to the observations of MM. Bellani, Dumas, Fuchs, and Deville, sulphur acquires a considerable degree of viscosity and colour. It is also the same temperature at which the production of soft sulphur commences, the relation of which to the thickening of sulphur has been pointed out by M. Dumas. According to the observations of M. Despretz, the coefficient of expansion for sulphur undergoes a considerable diminution between 302° and 392° F., and becomes a minimum. Lastly, the observations of M. Deville have pointed out a remarkable feature in the rapidity of heating and cooling of melted sulphur at this temperature. This correspondence between observations at different times and with very different objects is exceedingly remarkable. It shows that the increase of viscosity, the rate of expansion, as well as of heating and cooling, the production of soft sulphur and of insoluble sulphur, are correlative phenomena, which take place simultaneously

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* *Comptes Rendus*, xliv., 563.

and within a certain range of temperature. This would seem to lead to the conclusion that persistent conditions which sulphur presents at the ordinary temperature are not accidental, but arise from physical causes,—viz., the sudden cooling and an abnormal conservation of the latent heat. So long as soft sulphur only was known, this probable hypothesis was sufficient to account for its production. But it does not account for the production of the insoluble modification of sulphur, or for the relative conditions of the part which this kind of sulphur plays in compounds. When this modification is produced under the influence of heat, its origin appears to be connected with the condition which sulphur assumes at 338° F. and upwards. About this temperature the nature of sulphur is changed; up to this point its condition corresponds with that of crystalline sulphur, it is analogous to oxygen in its chemical relations. But, under the influence of heat, the conditions of persistence are changed, and the sulphur tends to acquire certain characters corresponding with those of insoluble sulphur, and to assume the state of an electro-positive substance. On the other hand, when cooled slowly below 338° F., it again acquires the liquid condition corresponding with crystallizable sulphur, without, however, passing into it instantaneously. So, likewise, when suddenly cooled, it passes through the liquid condition, but so briefly, that its nature is not entirely changed, and a portion of the solidified sulphur retains a molecular condition more or less analogous to that which it possesses at 338° F. This is the amorphous insoluble sulphur, the production of which is preceded by that of a corresponding soft sulphur.

This view of the subject represents tolerably well the whole of the phenomena which sulphur presents under the influence of heat. In order to place it upon a more certain basis, it must be proved that, at 338° F. and upwards, the whole of the sulphur is in a condition corresponding with insoluble modification. Under ordinary circumstances, however, sulphur that is suddenly cooled does not contain more than 30 or 40 per cent. of insoluble sulphur. Such a partial result may perhaps be ascribed to the necessity of the sulphur passing through the liquid condition at a temperature below 338° F., and meanwhile being converted in part into a condition corresponding with crystallizable sulphur. However, this conversion may be much more completely obviated if the conditions under which it takes place are more attentively studied. Indeed, the proportion of insoluble sulphur produced in the same experiment varies extremely, according to the duration of the cooling, which depends upon the relation between the mass and the surface of the sulphur—upon the chemical relation which it possesses at the time of pouring it out—upon the conductibility of the liquid in which it is cooled—upon the temperature at which this liquid boils, &c. Thus, for example, if the sulphur is poured into water in very thin threads or small drops, it will contain much more insoluble sulphur than when cooled in large masses. As much as 61 per cent. of insoluble sulphur may thus be obtained. When the melted sulphur is cooled in ether as much as 71 per cent. may be obtained.

In the conversion of melted sulphur into the insoluble modification, two successive phases are observable. At first the suddenly-cooled sulphur is soft, transparent, and elastic; when at this point it is drawn into thin threads or granules, it is almost entirely insoluble in bisulphide of carbon. Gradually, however, and especially by contact with a solvent, it becomes white, crystalline, and for the most part soluble in bisulphide of carbon.

M. Berthelot has succeeded in obtaining a still greater proportion of insoluble sulphur by sudden cooling, and in effecting this was guided by the following considerations. The insoluble sulphur produced by suddenly cooling melted sulphur is the least stable of any kind of sulphur. It is dissolved, as M. Deville* observed, by boiling alcohol. Indeed, by boiling for a few minutes with a small quantity of absolute alcohol, the whole of the portion which is not dissolved is converted by contact action into the modification which is soluble in bisulphide of carbon and crystallizable. In this character, and in several others, this modification of sulphur differs from the most persistent modification of electro-positive sulphur obtained from chloride or bromide of sulphur. Still all kinds of insoluble sulphur may, by contact with certain electronegative substances, be reduced to the extreme condition. Indeed, the stability of the insoluble modification of sulphur, produced under the influence of heat, may be increased; and it may be made to present cha-

* *Ann. de Chim. et de Phys.*, Ser. 3, xlviii., 103.

racters analogous to those of the insoluble sulphur obtained from flowers of sulphur, which resists the action of alcohol, though it is less stable than that obtained from chloride of sulphur, which, with exception of the colour, has the same character as the red insoluble sulphur obtained by Prof. Magnus. For this purpose, it is only necessary to place the insoluble sulphur produced by heat for some days in contact with strong mineral acids, especially sulphurous acid and fuming nitric acid. In this way, 75 per cent. of insoluble sulphur was obtained by using nitric acid, and 86 per cent. by using sulphurous acid.

ARSENIC IN PAPER-HANGINGS.

A good deal of discussion has recently taken place with reference to the use of paperhangings which have been coloured with arsenical pigments. The following paragraph appeared in the *Times* of the 6th of January:—

"Dr. Alfred Swaine Taylor, in his evidence before the Select Committee of the House of Lords, last session, on the Sale of Poisons Bill, after pointing out that arsenic was much used in several manufactures, such as in the manufacture of glass, especially opal glass, of shot, in the steeping of grain, and in killing the fly in sheep, states that the largest quantity of arsenic used in this country is used in the manufacture of paper for covering walls. He considered it very injurious both to those living in a house papered with this article, as well as to those employed in the manufacture. An instance was published in a medical work of some cases of illness occurring to persons living in a room papered with this paper, and the effects were described as those arising from arsenic. The colour, says Dr. Taylor, is put on very loosely; it contains nearly 50 per cent. of the poison. In addition to the above, Dr. Taylor handed to the Committee an envelope, the green tint on the inside of which he examined, and found to be formed of arsenite of copper. There is also an orange yellow which contains arsenic."

This drew forth a communication from Mr. Alfred E. Fletcher, who is engaged in the manufacture of arsenical pigment, and who states:—

"The colour principally referred to is the aceto-arsenite of copper, commercially known as emerald green. The chief advantage which this colour possesses over others of a similar tint is that, besides having greater brilliancy, it is quite permanent. The colour when exposed to the air for any length of time does not fade in tint nor lessen in intensity, which would necessarily be the case did any evaporation of its constituent parts take place, though in the smallest degree, especially as the layer of colour exposed is often extremely thin. Were it true such evaporation or dissemination went on it would indeed afford just cause of alarm, when we reflect that on the walls of houses in this country are displayed some hundred millions of square yards of paper, most of which carries on its surface a portion of arsenical colouring matter; our books are bound with paper and cloth so coloured, cottons and silks, woollen fabrics and leather, are alike loaded with it. Now, in the paragraph above referred to, it is stated that in a medical work an instance is noted in which injury has been received by those living in rooms decorated with these colours; surely were the proximity of such materials injurious it would not be necessary to search in recondite books for the registry of isolated cases. The fact of the large extent to which such materials have always been employed is a sufficient proof that there is no danger attending their use; moreover, workmen who have been daily employed for many years in manufacturing large quantities of these colours, under the necessity of constantly handling them, are in the regular enjoyment of perfect health, though exposed also to the general influences of a chemical factory. Let blame be laid at the right door, and let the public be assured that it is not the looking at cheerful walls, the fingering of brightly ornamented books, nor the wearing of tastefully coloured clothing that will hurt them, but the dwelling in ill-ventilated rooms, and a continual dread of pure water, will."

Mr. Fletcher's letter was followed by one from Dr. Halley, of Harley Street, describing the effects which he says were produced upon himself in consequence of his sitting for five or six hours every evening in a study papered with a newly-made rich emerald green flock paper. He says:—

"Within a few days I began to suffer considerably in my health from constant headache, dryness of throat and tongue, with internal irritation. I could attribute this to no particular cause, as no change had taken place in my habits, and up to

this period my health was excellent. Not to enter too much upon detail, suffice it to say that after some three weeks I became completely prostrated, almost losing the use of my left side, and was for some time under the care of two physicians. Not suspecting the room, as soon as I had somewhat recovered I returned to my study, and was alarmed to find that after a few days the same symptoms returned, and obliged me to desist; until at last I found that whenever I worked for any length of time in this arsenic-papered room I invariably suffered from the same set of symptoms, which did not come on if I remained in other rooms not so papered. Still, the cause was a mystery to me, as I was not aware that arsenic was used in paper-hangings, or that the paper in my room contained it, until, upon reading the *Medical Times and Gazette* for May 23, 1857, my attention was directed to a paper by Dr. W. Hinds, of Birmingham, describing the symptoms in 'a case of arsenical poisoning by a decorative wall-paper,' the details of which were remarkably similar to those that I had myself experienced and so severely suffered from. My paper was at once submitted to chemical scrutiny, and found to contain a very large quantity of arsenic in the form of arsenite of copper—nearly a drachm to the square foot. Still the question remained,—Was it the arsenic in this paper that really produced the unpleasant symptoms? The air of the room was next carefully tested (by means of sheets of paper soaked in a solution of the ammonio-nitrate of silver—a very delicate test for arsenic), and distinct crystals of arsenious acid, visible under a low power with the microscope, and sufficiently well defined and numerous to preclude the possibility of mistake, were obtained on two repeated and separate occasions. I need hardly say that after this the paper, though a costly, new, and handsome one, was stripped off the walls, and a plain wainscot oak paper substituted. I have since regularly used the room—the conditions of which in other respects remains the same—without experiencing any of the ill effects so constant before, and have now recovered my health.

"It may, perhaps, interest your readers if I state that from experiments since conducted by means of an aspirator, with a view to ascertain the amount and law of volatilization of the arsenic, the following results, though incomplete, may be fairly relied on:—

"1. That at ordinary temperatures with common atmospheric air the amount of arsenic given off is inappreciably small, although, in opposition to Mr. Fletcher's statement, these papers do not take long to decidedly fade.

"2. That even at a somewhat higher temperature with common air, the effect on these papers is not very marked.

"3. That no arsenic was detected in the gas supplied and used in the room.

"4. But that the products of the combustion of gas, passed through an 'aspirator' filled with arsenical paper, gave distinct evidence of the imbibition of arsenic in the passage of the air through the paper, crystals of arsenious acid being obtained from it.

"5. That although from temperament, &c., the deleterious effects produced by this combination of arsenic in the paper with the products of combustion of carburetted hydrogen gas vary considerably in character and amount of intensity, still that they are very generally experienced by persons inhabiting rooms so decorated and thus exposed to the influence of these papers; and when it is considered that the experiments upon the air in the room above detailed extended over a period of only some 10 hours each, and yielded distinct crystals of arsenic, it may be readily understood how a person constantly breathing—physiologically the most active means for imbibing the poison, arsenic—for several consecutive hours should suffer so severely in consequence of inhabiting a room so papered."

This subject is certainly one that demands a careful investigation. It can hardly be supposed, if those who are engaged in the manufacture of emerald green and are daily handling it suffer no inconvenience, that the mere occupation of a room the walls of which have been coloured with it, should produce effects such as those described by Dr. Halley; nor does it appear probable, considering the great quantities of such papers that have been used for many years, that they should be capable of producing such effects without a large number of instances of ill consequences having occurred, and suspicion of the cause having been excited thereby. The evidence adduced by Dr. Halley, founded upon the imperfect experiments he describes, although calculated to excite a grave suspicion, is insufficient to decide the question.

HYDRARGYRUM CUM CRETA, AND PILULÆ HYDRARGYRI.

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THESE mercurial preparations, which are so valuable in consequence of their gentle, mild, and manageable action, depend for their characteristic qualities upon the form in which the mercury is contained in them, and the preparations are mild and manageable just in proportion as the metal is properly comminuted and free from oxidation.

It is quite common to hear physicians complain that they have been forced, within a few years past, to abandon the use of mercury with chalk, because it so commonly excites vomiting and gastro-enteritic irritation; whereas, in the practice that has come under the personal observation of the writer, the preparation of the Pharmacopœia has never produced any such effects. The writer has, therefore, long coincided in the belief that these bad effects are due to the oxidation of the mercury in the short and faulty processes often adopted in preparing the medicine.

In a paper from the editor of this journal (vol. xxii., pp. 113 *et seq.*), it was pretty clearly shown that such conclusions were correct and reasonable; and it then only remained to be determined whether these labour-saving processes were the only causes of oxidation; and to obtain some easy practical method of ascertaining the condition and quality of any given sample.

In the preparation of mercury with chalk, there are two opposite conditions equally to be avoided. When the trituration is insufficient there is no oxidation, but the mercury remains in almost its original inert condition, although the globules may not be visible to ordinary observation even with a lens. The surfaces of the globules become covered and hidden by the fine powder of chalk, so that, though large, they are not easily seen. Such specimens, unless artificially coloured, are of a very light colour, and upon admixture with water afford in a moment a nearly white mixture, from the rapid subsidence of the mercury.

On the other hand, when the trituration is too long continued, the mercury becomes too finely divided, and in this condition oxidizes too rapidly and too readily, as well in the *primæ viæ* when administered, as during the process of preparation and in the keeping. In the trituration of the materials in the ordinary way, no appreciable oxidation occurs until the globules become too small to be seen by the naked eye. But after this point has been passed, the rate of oxidation increases rapidly as the mercury becomes more and more divided, until finally it may be in large proportion converted into suboxide by oxidation from the air. The art of making a good preparation, therefore, consists in excluding the air wholly or partially during the process, and in arresting the trituration at the proper time. Very finely divided mercury oxidizes and dissolves very easily, becoming first a suboxide, whilst this suboxide in its turn is still more easily converted into peroxide and metallic mercury. Thus the suboxide, which, under ordinary circumstances, is among the mildest of mercurial compounds, from the instability of its chemical character, is very likely to react with the vitiated secretions of cholera infantum, &c., just as Mialhe has shown that calomel sometimes does, and thus be easily converted into peroxide and perchloride. That this is the proper explanation of the undue activity of some samples of this preparation, is rendered almost certain by the writer's observations of the similar changes that spontaneously occur when such specimens are long kept with free access of light and air. Thus, a specimen prepared almost without contact of air, was of a very dark colour, and nearly free from oxidation. At the end of a year's exposure to light in a loosely stopped bottle, it was found to contain both oxides in very notable proportion. Another portion prepared by trituration with steam power for two days and a half, by a good mechanical arrangement, but without any attempt at excluding the air, was found at the end of the trituration to contain a notable proportion of suboxide, but no peroxide. A specimen of this, which has been kept in a tall slender loosely stopped bottle of white glass for two years and four months, now yields upon analysis a large proportion of both oxides. (See 6th analysis below.) This preparation, in its present condition, when administered to adult men in ordinary doses, still retains its proper mild character to such a degree, that its action would not attract ordinary attention. But in the cases of children, especially in that class of diseases in which it is commonly prescribed, it is found to be rather too

active for the indications to its use, though it does not produce vomiting at all. It is, nevertheless, undoubtedly a bad preparation, through too long trituration and bad keeping, but serves its purpose of clearly exhibiting the necessity for close attention and accurate observation in the process of preparation.

The best process for hydrargyrum cum creta, as far as the writer's experience goes, is as follows:—

Introduce the mercury with a portion of the chalk into a strong bottle, of double the capacity required, and shake the mixture actively, as originally proposed to Dr. Coxe, of New Orleans, by Mr. W. Hewson, of Augusta, Ga. (See *Am. Jour. Pharmacy*, vol. xxii., pp. 319 *et seq.*) When upon a smooth compressed surface of the powder the mercury is no longer visible to the naked eye, it is to be well triturated with the remainder of the chalk, until a fine smooth grey powder is obtained. It is then immediately put up in small phials, to be well secluded from light and air.

From the fact that very few Pharmaceutists make these preparations, it becomes much more important to have a means of testing the character of those of the common market, upon which they depend for supply, and therefore the writer has been at some pains to fix upon the following practical easy tests, which he believes to be capable of general and indiscriminate application, at the same time that they are reliable within practical limits.

The powder should be of a fine clear deep grey colour, rather of the lively silver tinge, than of the dull leaden colour. It should be entirely free from any rose, or "ashes of roses" tint; and the powder should be a little cumulative or clammy, and not at all mobile or sabulous.

A little heap of it, pressed upon a dark surface with a smooth spatula, should present no globules of mercury visible to the naked eye, and but few that are visible with an ordinary pocket lens, though looked at in all the various directions of a good light.

A small portion of the powder, shaken in a test tube with a large portion of water, and then allowed to stand for half an hour, with close observation, will afford some very clear indications of quality. If the mercury is in large globules, it will subside at once, and leave the chalk almost alone in suspension. This chalk then more slowly subsides and forms a stratum, the colour of which indicates the proportion of mercury that may have been either finely divided or oxidized. In other cases several distinct strata may be observed, from the silvery grey of the larger globules at the bottom, to the black layer of light fine oxide on top. The smaller the silvery stratum at the bottom, and the larger and more uniform the central leaden grey stratum is, the better the preparation. It is not easy to describe the indications and appearances of this simple test, but any one who will practise it two or three times, will be convinced of its utility. The uniformity with which the mercury is divided, and the extent to which the trituration has been carried, are best exhibited by this test.

A portion of the powder, treated with dilute acid in excess, till all the carbonate of lime is decomposed, is then boiled, and the clear solution separated from the residue by filtration. The acetic acid dissolves both oxides of mercury, and holds them in acid solution. If now a few drops of hydrochloric acid be added to the clear cold filtrate, it will decompose whatever mercurial salts are present, and form corresponding chlorides with the bases. The subchloride being insoluble, is at once precipitated, and from the quantity of this precipitate the quantity of suboxide is judged of. No well-prepared specimen of mercury with chalk, unless all contact of air has been avoided, is ever found absolutely free from suboxide by this test.

Specimens badly prepared in one direction are often found entirely free from suboxide (or other oxide), whilst if badly prepared in the other direction, or if long kept, with exposure to light or air, the precipitate with hydrochloric acid is not a mere opalescent milkiness, but it renders the liquid white and opaque, and within a few minutes begins to subside and collect at the bottom of the test glass.

After precipitating all the suboxide as subchloride, the precipitate is filtered out, and the filtrate is tested by adding ammonia in slight excess. If there has been any persalt of mercury in the original solution, it will have been changed by the HCl into soluble perchloride, and in this condition will have passed the filter. The ammonia precipitates this salt as ammoniated mercury or "white precipitate," and the proportion of this second white precipitate is indicative of the amount of peroxide in the preparation.

Now it happens that acetic acid, as well as hydrochloric, although without any appreciable action upon fluid metallic mercury, does act upon the metallic mercury in the state of subdivision in which it exists with well-made mercury with chalk; but the amount oxidized and dissolved by acetic acid, under the conditions of this test, is so small, that it may be disregarded in the practical application of the test. It is certain, too, that in the process of dissolving the suboxide in the acetic acid, particularly in boiling the mixture, a small portion of the suboxide is decomposed into metallic mercury and peroxide, so that when the original proportion of suboxide is very small, and peroxide altogether wanting, yet the testing may indicate the presence of peroxide without any suboxide, from this cause—a circumstance well illustrated in the third and fourth analyses, given below.

All the writer's experiments and observations, however, go to establish the fact that peroxide never occurs in these preparations, except through the condition of suboxidation as an intermediate step. The mercury is first suboxidized by the action of light and air upon it in its state of minute division, and the suboxide is then changed to peroxide by access of light and air.

The residue left undissolved by the acetic acid, consists of the mercury, the insoluble impurities of the chalk, and any earthy colouring matters that may have been used. In one of the samples examined—the fifth—a large proportion of the insoluble matter looked very much like old phosphate of iron. Evaporation of the mercury from this residue, at the lowest practicable temperature, from a watch-glass, leaves the fixed residue to be judged by its character and proportion.

By using a weighed quantity of the powder, and by weighing the dried precipitates as subchloride and sulphide (rather than as ammoniacal mercury), and by distilling the mercury from the residue into alcohol, and drying and weighing it, this process is readily converted into a practically sufficient quantitative analysis. This is the method adopted in the examination of the following specimens of hydrarg. cum creta:—

Five of the specimens were purchased at respectable central prescription stores, and the sixth is the specimen mentioned above, as having been exposed to light and air during twenty-eight months, in a narrow phial, after prolonged trituration.

The product of the officinal formula yields on analysis not 37.5 per cent. of mercury, as it should do in theory, but only about 36.9 per cent. or .6 per cent. minus. This deficiency is probably due to evaporation during the process.

SAMPLE.	PER-CENTAGE OF					
	Hg.	Hg_2O.	Hg O.	Ca O. CO_2.	Insoluble Matter.	Deficiency in Hg,
1st. Colour and appearance good	32.07	0.08	0.20	63.29	4.36	14.50
2nd. Colour and appearance good	35.52	0.33	0.21	63.94	traces	5.30
3rd. Colour and appearance pretty good.....	35.44	...	0.05	54.79	9.72	5.5
4th. Colour very light, large globules visible	37.42	...	0.12	56.49	6.67	0.21
5th. Colour light, greenish tinge	28.08	0.13	0.22	60.55	11.02	25.13
6th. Colour very dark, appearance good	34.2	1.21	1.44	63.15	traces	—

The result of these examinations does not justify the conclusions at which the writer had arrived, nor does it explain the cause of the complaints so generally made by physicians, since that sample which contained most of both oxides failed to produce the bad effects complained of. The proportion in this sample is still very small, however, and nothing like what other observers have found; and, therefore, as these six specimens can scarcely represent the market upon which the complaints are based, the writer's opinion and conclusions are in no degree changed as to the true cause of complaint being oxidation of the metal, although the examination has unexpectedly failed to establish the fact.

Six specimens of pilulæ hydrargyri were also examined qualitatively for oxides of mercury, and quantitatively for mercury, with the following results :—

SAMPLE.	PER-CENTAGE OF			
	Hg.	Hg^2 O.	Hg O.	Deficient in Hg.
1st. Olive colour, good consistence...	30.3	traces	traces	9.01
2nd. Good colour and consistence...	33.4	...	...	—
3rd. Olive colour, too stiff	29.1	notable proportion	...	13.7
4th. " " good consistence...	33.	notable proportion	...	1.
5th. Good colour and consistence ...	32.8	notable proportion	...	1.29
6th. Standard Laboratory prep.....	33.4	...	...	—

These specimens are from the same sources as the hydrarg. cum creta ; and from their examination, it appears that when well made, this preparation loses no mercury, neither does it oxidize any portion of it.

Whether the new form in which it is now coming into use, namely, that of "Powdered Blue Mass," will not impair its value, by subjecting it to greater risk of oxidation, is a question worthy of inquiry. The reasons for its use in such a form are stated to be its greater efficiency and certainty. If it be either more efficient or certain in this form, the circumstance may probably be explained by the fact of its being too often found materially deficient in both the quantity of mercury, and method of preparation.—*American Journal of Pharmacy.*

Naval Laboratory, New York, August, 1857.

TARAXACUM NOT A SOURCE OF FALLACY IN TESTING FOR MORPHIA.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—My attention has been called to Dr. Letheby's letter in your last number, the pseudo-explanation in which seems to have misled you into the belief that I was not fully acquainted with all the facts when I wrote the report of the inquest. There was no error or imperfect knowledge of the facts on my part, and all the statements published by me were derived from the parties actually concerned in the case, viz., coroner, jury, chemists, police-sergeant, &c. &c. ; I therefore was aware throughout that the deceased had had a bottle of medicine from the chemist three months before her death ; but I also knew that there was no evidence whatever, either direct or implied, that she had taken any other mixture than the taraxacum previously to her decease.

Dr. Letheby seeks to show :—

1. That taraxacum was not the cause of his error.

2. That he reserved his decision as to the presence of morphia in the stomach until he had examined the medicines ; and

3. Complains that I did not write to him instead of the *Medical Times and Gazette*, and stigmatises me as an "idle looker-on at the inquest."

With respect to the 1st point, Dr. Letheby's own letter to the coroner said the "resinoid" was in the "dark ethereal mixture in the six-sided bottle," and I have already adduced the testimony of the gentleman who dispensed the taraxacum mixture that it was "*a dark ethereal mixture in a six-sided bottle*" (*Medical Times and Gazette*, Dec. 12, page 613). Moreover, Mr. C. Macarthy found that upon re-making the mixture with the same drugs the result was exactly the same, and in no respect resembled the "*pale sherry-coloured mixture*" which Dr. Letheby (*Medical Times and Gazette*, Nov. 28) describes the other mixture in the oval bottle to have been. Dr. Letheby has not ventured to impugn this evidence in his letter subsequently written, viz., in *Medical Times and Gazette*, Dec. 19th.

2. That Dr. Letheby made no reservation when announcing the detection of morphia, I have already shown, in the same journal, upon the evidence of the coroner, the chemists, and the police-sergeant ; but it is manifest that in any case he had no

right to make a reservation. A medical jurist ought to be able to state positively whether he has or has not found poison, and he ought not to depend upon the examination of medicines or any other external evidence, but unconditionally upon the evidence afforded by the contents of the stomach.

3. As to Dr. Letheby's complaint that I ought to have written to him instead of the *Medical Times and Gazette*, it is clear that evidence (and *such* evidence !) given in an open court upon oath is not a subject for a private note, and "idle" (*i.e.*, industrious) "lookers-on" will always be a safeguard to the public in medico-legal inquiries, although their presence upon this and upon a former occasion has proved inconvenient to Dr. Letheby.

I cannot forbear pointing out the absurdity of the consequences involved in Dr. Letheby's pseudo-explanation.

First, he would suggest that the deceased, having consulted a physician shortly before her death, and having had by his order pills and a taraxacum mixture, took the pills, but, rejecting the taraxacum, took with them a stale mixture which she had had in the house for three months ! !

Secondly, he suggests that although there was no pretence that deceased had taken any mixture but the taraxacum, the coroner and jury stultified themselves by accepting the reactions of another mixture as explanatory of the reactions of the contents of her stomach ! !

Neither of these absurdities merits a word of comment.

There is one most important point still to be spoken of, viz., Dr. Letheby's statement that "*a tenth of a grain*" of morphia is a "*trace.*" (!) He says (*Medical Times and Gazette*, Nov. 29, p. 560) that the stomach contained half a tablespoonful of thickish fluid. "This was *carefully* tested for opium and other poisons, and furnished a trace of what I thought was morphia." "I said the quantity might be about *the tenth part of a grain*, and this would represent about a grain of opium. My opinion at that time certainly was that deceased had died from the effects of morphia."

In his letter to the coroner he says, "I do find in the dark ethereal mixture in the six-sided bottle a peculiar resinoid body which exhibits several of the reactions of morphia, and this *I am disposed to think* (!) is the matter which I found in the stomach. Having it in larger quantities I can easily distinguish it from morphia, but where it occurs as A TRACE ONLY *in the contents of the stomach* it is possible that it was mistaken for that poison."

It is clear, therefore, that Dr. Letheby considers a visible and ponderable quantity a trace ! How far an analysis can be considered to be carefully performed which leaves an analyst in error as to whether a visible quantity is or is not morphia, I leave your readers to judge ; but I cannot refrain from protesting against the looseness of the manner with which Dr. Letheby "is disposed to think" that it might have been mistaken for morphia ; and this in a matter of evidence upon oath, which might involve the life, liberty, or reputation of innocent persons ! It will be remarked that Dr. Letheby leaves the "resinoid" as an unexplained and mysterious something, to bewilder the mind of the reader and draw him away from the taraxacum, and make the whole affair ambiguous, in which there is really no ambiguity. His method of treating the matter reminds me forcibly of the *modus operandi* of that sagacious creature the cuttle-fish, which, upon the approach of anything disagreeable, conceals itself in the nebulous mystery of *its own ink.*

I am, Sir, yours, &c. &c.,

Romford, Jan. 22, 1858. NORRIS F. DAVEY.

[This controversy shews the importance of caution in implicating any person or persons by an opinion prior to the completion of a chemical analysis. A candid avowal that the first impression was too hastily stated, would have been more manly than the attempt to throw the responsibility on the dispenser of the medicine. We hope the controversy is concluded.—ED.]

POISONING BY PRUSSIC ACID.

AT Glasgow, December 24th, John Thomson, *alias* Peter Walker, was tried before the Lord Justice-Clerk and Lord Cowan. The indictment charged the prisoner with murder, in so far as on Sunday, the 13th of September, 1857, within the house situated in the village of Eaglesham and shire of Renfrew, then occupied by a young woman named Agnes Montgomery, aged twenty-seven years, who was employed as a reeler in a mill, he (the prisoner, John Thomson, *alias* Peter Walker) wickedly

and feloniously administered to the said Agnes Montgomery, in beer, or in some other article of drink or food, a quantity of prussic acid, in consequence of which she died immediately afterwards. Further, the prisoner was charged with administering on the 25th or 26th days of September following a quantity of prussic acid mixed in whisky to Archibald Mason, manufacturer in John Street, Glasgow, and also to his wife, in consequence of which they were put in danger of their lives, and seriously affected in health and person.

It appeared from the evidence that the prisoner, who is a returned convict, had, in June last, been engaged by James Watson, a tailor in Eaglesham, to work for him, giving his name as John Thomson, and thus became acquainted with the deceased, who was sister to Watson's wife. It was proved that she was in perfect health on Sunday, Sept. 13th, and was seen returning from church about four o'clock, and to go out again; she was afterwards seen returning home with the prisoner and his master's little girl. Shortly afterwards a rumbling noise was heard on the floor of her room, and in about five minutes the prisoner was seen to leave the room with the little girl and to lock the door. A moaning was heard by several persons who lived in the same house; and the door was opened by means of one of the neighbour's keys. Agnes Montgomery was found sitting on a chair, her head leaning on a table, insensible, and foaming at the mouth: the head was thrown back as though in distress, and after several deep moans she died about six o'clock. A peculiar smell was observed in the room, the effect of which was described by a witness as "a nipping of the nostrils, and dryness of the throat" (the same peculiarity was recognized by this witness when afterwards some prussic acid was mixed with beer from the same barrel as that supplied to the prisoner on the 13th of September). The prisoner, who was present, went for the doctor, and on the way was seen to stoop at the root of a tree, where afterwards the key of deceased's door was found. The carrier's boy deposed that he took a note from the prisoner to Mr. Hart, Druggist, Glasgow, from whom he got a phial; he was told by the prisoner that he wanted the stuff to dye his hair, but that if he was asked by the Druggist, to say it was for a photographer. Mr. Hart's assistant, Stirling, proved the sale of the prussic acid to the boy on the 12th of September, which was delivered by the latter to the prisoner on the 13th. The judge commented severely on the carelessness of Stirling in supplying the poison, observing that he got no satisfactory answer to his question as to the party for whom the acid was wanted, and did not believe it was intended for the use alleged, and yet gave it without further inquiry.

At the examination of the body, the stomach and other parts were removed by Dr. McKindlay, of Paisley, and his son, who distinctly found prussic acid; other portions of the stomach, &c., were sent to Dr. Douglas Maclagan, of Edinburgh, who analyzed them, and also found prussic acid. It was also proved that the prisoner had gone to the house of the Masons, in Glasgow, where he lodged for a night or two, and that on the night of September 25th, he went into Mason's room and produced a pint bottle of whisky, of which both Mason and his wife took a little from a glass; they were both ill, the wife dangerously. The contents of this bottle were analyzed and found to contain whisky mixed with prussic acid. It was also proved that the carrier's boy got a second supply of acid from Hart's, the Druggist, on the 24th of September, the day before the prisoner left Eaglesham for Glasgow.

After the case for the Crown had closed, Mr. Herriott addressed the jury for the prisoner, and the Lord Justice Clerk then summed up, going minutely over the whole of the evidence. The jury then retired at half-past six to consider their verdict, and returned at ten minutes to seven, with a verdict unanimously finding the prisoner *guilty* of murder, as charged in the first count of the indictment. His Lordship then sentenced the prisoner to be hanged on Thursday, the 14th of January, at Paisley.

THE following is Mr. Stirling's explanation:—

EAGLESHAM POISONING CASE.

TO THE EDITOR OF THE DAILY BULLETIN AND NEWS.

SIR,—The Lord Justice-Clerk in his remarks at the close of my examination, yesterday, said there was gross carelessness on my part in selling the prussic acid to John Ferguson. I feel myself guilty of none. For upwards of three years Ferguson has called at Mr. Hart's shop twice a week, and got drugs of every description

for customers in Eaglesham. He simply did as all carrier's porters do who are in the custom of making weekly purchases at such establishments, presented the line signed by John Thomson, requiring him to get the article; and, after eliciting from him that the said J. T. was an amateur photographer, and that the acid was required for his experimenting with in that science, the article was given—suspicion being entirely disarmed from the information obtained from him. To no stranger would I have sold prussic acid, but to a constant caller at Mr. Hart's shop.

None can more deplore than I the use to which the acid was put; but, at the same time, I must state that every necessary precaution was taken in supplying it, and therefore feel that the remarks of his lordship were not only cruel, but uncalled for.

I am, &c.,

Glasgow, Dec. 24th, 1857. GEORGE STIRLING.

POISONING BY ARSENIC.

ON Monday, January 4th, an inquest was held at Shoreham, before Mr. F. H. Gell, Coroner for East Sussex, upon the bodies of Esther Puttick, married woman, aged thirty-seven, and her stepson, Frederick Puttick, aged fifteen. From the depositions of Thomas Puttick, who was then suffering from the effects of the poison, it appeared that on Thursday morning, December 31st, he said to his wife, "There is a little flour in the house, you may as well make a little pudding." The pudding was accordingly made, of which Thomas Puttick, his wife, and son all partook. Shortly after dinner they were attacked with great pain, vomiting, and purging. Medical men were sent for, but the son, who appeared to have eaten more freely of the pudding, died the same evening, and Esther Puttick died the next morning.

Edward Henry Moore, Chemist, deposed that he had examined what was represented to him as the vomit of the woman, in which he had discovered arsenic: he had also analyzed a portion of the pudding, in which he had found a very large quantity of arsenic.

Thomas Fuller, Surgeon, who had been called in, gave evidence as to the symptoms, which were those of arsenical poisoning; he had made a *post-mortem* examination, from which he concluded that death was caused by arsenic.

The inquest was then adjourned for a fortnight, and in the interval Thomas Puttick died, on Friday, January 8th. The inquest was resumed on Monday, January 11th, when the jury returned the following verdict:—"That Frederick Puttick, Esther Ann Puttick, and Thomas Puttick died from the effects of arsenic, which had been mixed in hard pudding, and which penetrated the cabbage boiled with the pudding, which they (the deceased) had partaken of for dinner, but how, or by what means mixed, they have no evidence to show. They also find that Thomas Puttick was guilty of great negligence in leaving arsenic in a cupboard which was accessible to his family, his wife being subject to fits, which had a tendency to weaken her intellect."

POISONING BY ESSENTIAL OIL OF ALMONDS.

ON Tuesday, December 27th, an inquest was held on the body of Mary Jane Nicholson, before Mr. J. P. Wood, the coroner, at the house of Mr. Hick, the Exchange Hotel, Church Street, York. The evidence went to prove that for the last six months the deceased had resided in Leeds with her uncle, a confectioner and eating-house keeper at that town, whom she assisted in his business. On the previous Wednesday evening she arrived at the house of her father for the purpose of spending Christmas with him. She appeared quite well in health, but was in very low spirits. She did not assign any reason for being so, and her parents knew of no cause for her depression. She was to have returned to Leeds on Monday next, and on the night of Monday last she retired to rest at the same time as the other portion of the household—viz., about half-past ten o'clock. At eight on Tuesday morning Mrs. Nicholson went into the deceased's room to call her up. She spoke to her daughter, and receiving no answer, she found she was dead. Mrs. Nicholson fetched her husband up-stairs, and Mr. Nicholson immediately went for Mr. Marshall, Surgeon, Davy-gate. He attended in a short time, and found the body of the deceased was warm, but the extremities and face were cold, and he thought she had been dead six hours at the least. The deceased was laid on her

right side with her knees drawn up and her hands contracted. There was some liquid on the pillow-case and the sheet, which smelt strongly of essence of almonds. There was a very strong odour of essence of almonds in the room, and in a utensil on a chair by the side of the bed was some essential oil of almonds diluted with spirits of wine. A bottle which contained a similar fluid was found in a drawer in the deceased's room, and Mr. Marshall thought that as the oil of almonds was diluted, the deceased would be able to drink some out of the bottle, place it in the drawer, and get into bed after doing so. Her mouth smelt strongly of essential oil of almonds, and in Mr. Marshall's opinion she had died of poisoning. The jury returned a verdict that she poisoned herself while in a state of temporary insanity.—*York Herald.*

POISONING BY COLCHICUM.

On Tuesday, Dec. 29th, an inquest was held at Birmingham on Mr. T. Woodward, aged forty-one, of New John Street West. His widow stated that some time ago he sprained the toe of his right foot, and had since felt great pain at intervals, and he used colchicum wine to allay the suffering. On the day after Christmas day he went on a car to the Ashted Tavern, and partook of some liquor, but was quite sober. At six o'clock his toe pained him very much, and he sent a young man for three-pennyworth of colchicum wine. This was procured. The quantity nearly filled an ounce bottle, and Mr. Wilcox, the Druggist, ordered that only seventeen drops of it should be taken. But owing to the severe pain Mr. Woodward took the whole contents of the bottle within two minutes. He remained an hour at the tavern after this, and said he felt quite well, and so free from pain that he would walk home, which he did. On going home he ate heartily of bread, cheese, and onions. He then felt sick, and his bowels became in pain. The sickness and purging increased. Mr. Wilkinson, Surgeon, prescribed for him, but he continued to sink, and at twelve o'clock at night he died calmly, as if he was going to sleep. Mr. Wilkinson deposed that he had known an instance in which thirty drops of colchicum wine had killed an adult. He never prescribed more than fifteen drops.

[It would be interesting to have the fatal case of poisoning by thirty drops of colchicum wine, alluded to by Mr. Wilkinson, authenticated, as the smallest fatal dose on record is that quoted by Majendie in his "Formulary," in which case 2½ drachms proved fatal.]

DEATH BY DRINKING HOT WATER.

On Wednesday, Dec. 30, Mr. Carter, the Surrey coroner, held an inquest at the Salutation tavern, Princes Street, Lambeth, on the body of Arthur Rivers, aged three years and ten months. It appeared that the deceased resided with his parents in Thomas Place, Thomas Street, Lambeth. On Christmas-day last a nurse, who was attending the mother in her confinement, placed a kettle of boiling water upon the table, from which the child drank, and although medical aid was promptly obtained, the sufferer lived only twenty-five hours. The jury having returned a verdict of accidental death, the coroner hoped that the present case would act as a warning to parents, by never allowing children to drink out of either teapots or kettles, whether the water contained therein was hot or cold, for if they were allowed to drink from such vessels when the water was cold, they were apt to make a mistake and drink the water when hot.

OBITUARY.

DR. JOHN FORBES ROYLE.

Science has sustained a loss in the death of Dr. Royle, which took place at his residence, Heathfield Lodge, Acton, Middlesex, on Saturday, Jan. 2nd. He had been for many weeks in ill health, but his death was sudden at last. Dr. Royle was educated in London for the medical profession, and was a pupil of the late Dr. Anthony Todd Thomson, from whom he seems to have acquired that taste for the study of botany which afterwards distinguished him. Having passed his medical examinations, he entered into the service of the East India Company, and was for many years

stationed in the Himalaya, where he had great opportunites afforded him of studying, not only the plants of that district, but of the whole empire. He was appointed superintendent of the East India Company's Botanic Garden at Saharempore—a position which gave him the largest possible opportunity for studying the indigenous Flora of Hindústan. The result of his labours was given to the world in a magnificent work, entitled *Illustrations of the Botany and other branches of Natural History of the Himalayan Mountains, and of the Flora of Cashmere.* This work was published, in folio, with plates, in 1833, and at once gave to the author a European reputation as a botanist. In this work Dr. Royle gave the result of his researches into the medical properties of a large number of plants, as well as the history of drugs used in Europe, whose origin was unknown. In 1837 he published an essay *On the Antiquity of Hindoo Medicine*, a work displaying much learning and research. On the opening of King's College, London, as a medical school, the knowledge of drugs and plants possessed by Dr. Royle pointed him out as a fit person to hold the chair of Materia Medica, a position which he filled till the year 1856. Whilst lecturing on this subject he published his *Manual of Materia Medica*, a book which is now used as a text-book on the subject in medical schools. His extensive knowledge of the natural history of India made him a valuable contributor to the periodical scientific literature, and he was a contributor to the *Penny Cyclopædia* and Kitto's *Dictionary of the Bible*, and other works. He took an active interest in promoting a knowledge of the material resources of India; and, in 1840, produced a work which perhaps will be read with more interest now than when it was published, *On the Productive Resources of India.* During the period of the Russian war, Dr. Royle drew attention to India as a source of the various fibrous materials used in the manufacture of cordage, clothing, paper, &c., by a lecture delivered before the Society of Arts in 1854. This lecture was afterwards expanded into a valuable work *On the Fibrous Plants of India,* which was published in 1855. In the preface to this work, he announced that he was employed in a general work on *The Commercial Products of India*, which, we believe, has not yet appeared. Dr. Royle was a Member of the British Association for the Advancement of Science, at whose meetings he often read papers, two of which deserve especial attention—one *On the Cultivation of Cotton*, and another *On the Cultivation of Tea in the East Indies.* He took an active interest in the last subject, and his efforts have been attended with complete success; as tea, rivalling that from China, is now produced in abundance in the Himalaya. For a short time he held the office of Secretary to the British Association for the Advancement of Science. He took an active interest in the development of the plan of the Great Exhibition of 1851; and the success which attended the exhibition of the Department of Indian Products was due, in a great measure, to his efforts. He was a Fellow of the Royal, Linnæan and Geological Societies, and at the time of his death held an appointment in connexion with the East India Company in London.

[The above is taken from the *Athenæum*, of Jan. 9th. Dr. Royle always took a great interest in the progress of Pharmacy, and was a warm supporter of the Pharmaceutical Society. After the death of Dr. Pereira, Dr. Royle was considered the highest authority in Materia Medica, and his "Manual" on that subject is now one of the text-books in use by our students in preparing for the examinations.]

BOOKS RECEIVED.

The Radical Theory in Chemistry. By John Joseph Griffin, F.C.S., &c. London: John Joseph Griffin, 119, Bunhill Row. 1858. 8vo, pp. 573.

A Sketch of the Principles and Practice of Subcutaneous Surgery, *being the Oration delivered before the Medical Society of London, March*, 1857. By William Adams, F.R.C.S., &c. &c. London: John Churchill, New Burlington Street. 1857.

Toothache, and other Affections of the Teeth, relieved by the Electric Cautery. By Thomas H. Harding, Surgeon-Dentist. London: Walton and Maberly. 1857.

The principal part of this little volume has appeared before in the pages of the *Lancet*. The advantages of the electric cautery over the actual cautery consist in the facility with which the amount of heat may be regulated, and in the light given off by the wire, which enables the operator to apply the cautery to the sensitive pulp only, without carbonizing the cavity of the tooth.

A Smee's battery is used, and the cauterizer consists of the terminal six inches of the poles, which are of copper wire plated, supported on an ebony or ivory handle, upon the side of which one of the poles is interrupted at a particular point. The extremities of the poles are connected by a piece of platinum wire, a hundredth of an inch thick, and three-quarters of an inch long, which is bent into a loop. The sides of the loop are then brought parallel and nearly close to each other, without touching, and it is thus introduced into the pulp cavity of the tooth to be operated upon.

TO CORRESPONDENTS.

Liquor Potassæ Arsenitis.—We have received a communication from Mr. Whipple on this subject, in which he says, "The statement that" it is a solution of arsenious acid in carbonate of potash "does not harmonise with my experience, and I am sorry that Mr. Bamber's paper upon the subject was not inserted, since it may have assisted the inquiry." The statements to which this correspondence refers were made at a meeting of the Pharmaceutical Society in April, 1857, reported in this Journal for the following month, at page 542, when Dr. Garrod and Mr. Redwood represented the *Liquor Potassæ Arsenitis* of the Pharmacopœia as a solution of arsenious acid in carbonate of potash. To test the accuracy of this statement, Mr. Bamber says, "I first boiled carbonate of potash with excess of arsenious acid, passing the gas (should any be evolved) through lime water, on which I obtained an abundant precipitate of carbonate of lime, clearly indicating decomposition of the carbonate of potash." The solution thus obtained was filtered and evaporated to dryness, and the dry mass was found to consist principally of arsenite of potash. Now, we stated in our last number that the experiments described are insufficient to determine the question. It is admitted that decomposition of the carbonate of potash would be effected under the conditions presented in Mr. Bamber's experiment, but those are not the conditions presented in the process of the Pharmacopœia. The question is, not whether arsenious acid can be made to expel carbonic acid from carbonate of potash, but whether the solution of the Pharmacopœia is a true arsenite or a solution of arsenious acid in carbonate of potash. The gist of the subject is comprised in the following statement in Gmelin's *Handbook of Chemistry*:—"Arsenious acid dissolves easily in aqueous solution of potash; from a solution of carbonate of potash it does not expel the carbonic acid until heat is applied, and even then but slowly." In the process of the Pharmacopœia for *Liquor Potassæ Arsenitis*, 80 grains of arsenious acid and 80 grains of carbonate of potash are boiled with half a pint of distilled water until they are dissolved. In performing the process, the solution will be complete before the water has attained the full boiling temperature, but no evolution of carbonic acid takes place until active ebullition occurs, and even then the decomposition is so slow, that, after boiling for several minutes (which is unnecessary according to the process), there will be but an insignificant portion of arsenite of potash formed. The extent of the decomposition at any stage of the operation may be easily determined by liberating the carbonic acid from the liquid by means of a strong acid, and estimating its amount. The solution may be boiled for an hour, keeping the quantity of liquid to its original amount, without effecting the decomposition of the carbonate of potash.

J. F. (Barrhead).—The spontaneous ignition of pills containing oxide of silver is occasioned by the rapid reduction of the oxide and combination of the oxygen with combustible matter contained in the pills.

T. K. W.—The composition of citric acid was formerly represented by the formula given by Brand and Phillips. The formula now generally adopted by Chemists is that of Liebig and others, who, assuming that each atom of acid requires three atoms of base to neutralize it, or, in other words, that it is tribasic, multiply the number of

atoms by three, but subtract an atom of hydrogen and of oxygen, which are assumed to exist as water.

W. T. R. F.—We would suggest the substitution of carbonate of soda for carbonate of potash.

Chemicus (Leamington).—*Effervescing Citrate of Magnesia*, vol. xv., page 288.

W. W. (Newton Abbot).—(1.) We know of no means of depriving cocoa-nut oil of its peculiar smell.—(2.) Parnell's *Elements of Chemical Analysis.*

Aspirans (Barking).—Balfour's *Outlines of Botany.*

Senex.—We have no space for answering such questions.

An Apprentice has sent us a description of a "percolator:" the method is one which is often adopted.

A. P. (Pimlico).—(1.) Crystal Varnish for Photographs may be made by dissolving 80 grs. of amber-beads in 1 oz. of chloroform, and separating the clear portion by filtration.—(2.) *Liquid Jet.* Asphalt, 4 oz. dissolved in 10 oz. of mineral naphtha, with the addition of 30 grs. of caoutchouc dissolved in the same menstruum.

Botanicus (March).—Coloured drawings of plants and flowers are not published separate from the works describing them.

A Constant Subscriber (Ixworth).—*Liquor Taraxaci*, vol. xi., page 582.

S. (Settle).—The label referred to is not liable to stamp duty.

An Apprentice (Lewes).—(1.) White Gutta Percha, used for dental purposes, may be obtained of Mr. Pratt, 13, Broad Street, Golden Square, London.—(2.) Miller's *Elements of Chemistry* (Parker), £2 6*s.* 6*d.*

G. F. P.—The subject will be duly considered by the Council.

A Member (Pershore).—Spoonful is either one word or two words. If one word, the plural is spoonfuls; if two words, a patient swallowing three spoons full of medicine would of course swallow three spoons as well as their contents.

A Correspondent (London).—(1.) The heavy carbonate of magnesia is a better preparation than the light: the difference being only mechanical, either may be used.—(2.) When Linimentum Camphoræ is ordered, it is possible that the compound may sometimes be intended, but the words can only be correctly interpreted as denoting the simple.—(3.) The assumed error in the work alluded to is no error at all.

M. A. B. (Brighton) has favoured us with a letter on the Sale of Poisons, which is written under the impression that a change has taken place in the opinions and temper of the Members of the Society in reference to this subject. This is entirely a mistake. No such change has taken place in the Society, which has, for upwards of seventeen years, maintained the same ground, and advocated the same policy. Whatever change has taken place is in the public mind, which, from a state of apathy, has rushed to the opposite extreme. It is a mistake to suppose, because the Society has endeavoured to reduce the prevailing excitement within the bounds of reason and common sense, that it has therefore swerved from its principles.

G. K. (Hastings).—The proposed exemption has been refused.

C. S. (Evesham).—(1.) *Pharmacopœia Londinensis*, 5*s.*—(2.) *Pharmaceutical Latin Grammar*, 5*s.*

A. B. (Torquay).—(1.) Duplicate diplomas could not be granted. There should be a partner in each establishment.—(2.) Tomes' *Dental Physiology and Surgery.*

Instructions from Members and Associates, respecting the transmission of the Journal, to the Secretary, 17, Bloomsbury Square, before the 20th of the month.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XVII.—No. IX.—MARCH 1st, 1858.

THE POSTPONEMENT OF LEGISLATION ON THE SALE OF POISONS.

Copies of the Report of the Committee on the Sale of Poisons Bill having been forwarded to Lord Granville, with a request for the favour of an audience for the purpose of more fully explaining the circumstances which had led to such conclusion, his Lordship appointed Saturday, the 20th of February, for that purpose.

The defeat of Lord Palmerston on the "Conspiracy to Murder Bill," on the previous evening, having been followed by the immediate resignation of Her Majesty's Ministers, the intended interview did not take place—Lord Granville having intimated that under existing circumstances it would be useless to go into the subject at present, but that in the event of its being resumed, his Lordship would make another appointment. It may, therefore, be understood that the Sale of Poisons Bill is shelved for the session, at all events; and it is doubtful when and by whom, if at all, it will be again introduced. Matters of much more grave importance will, for some time to come, occupy the attention of the Government—and the adjustment of some delicate questions of foreign policy having been made the pretext for a fresh struggle for place and power, the new Ministry and the Opposition will have enough to do to settle their differences and find their level, instead of entering on the details of such a subject as the classification, registration, and Sale of Poisons.

It is, however, satisfactory to be assured that the question is not likely to be resumed in Parliament without due notice, and the opportunity of a full and impartial consideration of its merits.

THE POSITION OF THE CHEMISTS AND DRUGGISTS.

The recent discussions on the sale of poisons have led to a consideration of the relative positions of the several classes of persons by whom they are sold. Under whatever aspect we review the question, it is clear that the fulcrum on which the public safety rests, is the efficiency of the channel through whom the supply is transmitted. The entry of the sale of poisons presupposes that the vendor can read and write; the precautions of labelling, identifying, and classifying poisons, imply the existence of the faculty of discrimination in the party charged with such responsibility; and the proposal in the second edition of the Government Bill, to institute a grade of licensed Druggists, with

reference to their competence to deal in poisons, is a recognition of the principle of qualification as the condition of such licence.

In the present state of the law, the retailers of poisons may be divided into four classes :—

1. Legally qualified Medical Practitioners.
2. Pharmaceutical Chemists.
3. Chemists and Druggists.
4. Chandlers and small shopkeepers.

In the course of the arguments which have arisen, as to the terms and conditions of the proposed licence, it has been found difficult to separate the capacity for selling the list of articles arbitrarily designated as poisons, from the general qualification to deal in drugs; and, accordingly, the term *Licensed Druggist* was introduced in the Government Bill, to denote the parties to whom the section refers. This adds a new and important feature to the proposed measure. Instead of being, as its name implies, merely a Sale of Poisons Bill, it is in fact a Bill for ensuring the due qualification of Chemists and Druggists, which is a step in the direction towards which the Pharmaceutical Society has been aiming from its commencement. Although the Poison Bill is abandoned for the present, the admission which it contains as to the necessity of a qualification to deal in drugs, ought not to be lost sight of, and may be referred to at a future time.

It is not improbable that the investigation which has taken place on the subject may, eventually, result in an extension of the provisions of the Pharmacy Act; which would be the most easy and effectual mode of securing the public against danger from the careless and indiscriminate sale of poisons.

Although the fact has been doubted, we are prepared to show that the Chemists and Druggists are, as a body, interested in such extension of the powers and jurisdiction of the Pharmaceutical Society. Under any circumstances, the vested rights of all persons now in business as Chemists and Druggists would be reserved, and thus they would be commercially identified with the interests of Pharmaceutical Chemists, although not privileged to use the title. There ought to be no jealousy or conflict of prejudice between the two classes. The Pharmaceutical Society was intended to comprise all; and some of those who declined the invitation to join it, may indirectly participate in its advantages by giving their sons the opportunity of qualifying themselves and passing the examinations; others, who had seceded, may resume their membership, and all are ready to take advantage of the influence of the Society in case of need. Whenever any invasion of the interests of the trade is threatened—for example, when an obnoxious Bill is brought into Parliament—the scattered Chemists and Druggists having, no union or organization among themselves, lose no time in applying to the Members of the Society in their respective localities for such advice and protection as the influence of an organized body enables it to afford. The Society is also

glad to co-operate with Chemists and Druggists in petitioning Parliament in reference to any matter in which their interests are mutually concerned, and it would be greatly to the advantage of all parties that these interests should be more completely identified and consolidated by the admission of all future Chemists and Druggists into the Pharmaceutical Society.

In reference to the four classes of persons above referred to as retailers of drugs, including poisons, the first two, Medical Practitioners and Pharmaceutical Chemists, are recognized by law as qualified persons, and therefore require no other licence. The Chemists and Druggists already in business may, in justice, claim the privilege of a licence on furnishing proof that they were in business prior to a certain date. The chandlers and small shopkeepers who have no pretensions even to the name of a Chemist and Druggist, ought to be thankful at being released from the responsibility of selling laudanum, corrosive sublimate, arsenic, and other deadly poisons, while they are permitted, without restriction, to deal in salts and senna, sulphur, cream of tartar, and other common domestic medicines. The Chemist and Druggist would, in a few years, if this principle were carried out, merge into the Pharmaceutical Chemist; and in anticipation of this much-to-be desired result, both classes should lay aside all feelings of rivalry or distrust, and co-operate in the endeavour to bring about such an amendment of the law as their joint interests and the welfare of the public may require.

Occasionally while discussing the probabilities of legislation on this subject, we hear a remark like this from a faint-hearted Member of the Society—"Even supposing the examination to be made compulsory, it is scarcely likely that Parliament would entrust the management to the Pharmaceutical Society." "And why not?" we inquire. "Is it because the Pharmaceutical Society is composed of practical men who understand the subject? Is it necessary that persons entrusted with a responsibility should be practically ignorant and inexperienced in the matters which are placed under their control? or should their qualification be theoretical inventive genius like that from which the Poison Bill emanated?" Certainly not.

If Pharmacy is to advance and prosper in this country, it must be under the fostering care and management of the Pharmaceutical body. If any science, art, or profession is to be well governed, it must be entrusted to its own members—those who by education, experience, and daily pursuits, are identified with its progress, and acquainted with its requirements. No other profession is subjected to extraneous jurisdiction and interference, and why should Pharmacy be a solitary exception? If the faint-hearted Member will consider the question on its merits, and apply the test of common sense, he will, we think, dismiss his timid misgivings, and, animated with a laudable ambition, will join in the general cry for JUSTICE.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

THE USE OF METHYLATED SPIRIT.

Inland Revenue Office, London, W. C.,
Feb. 1858.

Sir,—I am directed by the Commissioners of Inland Revenue to send you the accompanying Minute of the Censors' Board of the Royal College of Physicians of London; and to state that the Commissioners have ascertained that the Colleges of Edinburgh and Dublin concur in the desire of the London College to dissipate the impression that a departure from the rules of their Pharmacopœias has been countenanced by the legalization of methylated spirits.

Such an impression can only have arisen from very erroneous views of the powers and intentions of this Department; but, since it appears to prevail, it is necessary that the Commissioners should distinctly warn all persons using the methylated spirits in medicinal preparations that the permission granted by this Department conveys no authority to apply the spirits in any manner not sanctioned by the Colleges of Physicians.

I am, Sir, your obedient servant,

Thos. Dobson, *Asst. Sec.*

(Copy.)

Royal College of Physicians,
Nov. 25, 1857.

The President and Censors of the Royal College of Physicians, having had their attention called to an unauthorized departure from the instructions of the Pharmacopœia in the manufacture of tinctures and other preparations, by the use of methylated instead of pure spirit, have found it necessary publicly to express their disapproval of such departure; and beg to call the attention of the Board of Inland Revenue to the fact, that an assumed authority for this deviation from the rules of the Pharmacopœia is said to have been derived from an Order or Minute of the Board of Inland Revenue giving a general permission to use methylated spirit in the preparation of medical tinctures and extracts.

AT A MEETING OF COUNCIL, *February 3rd,* 1858,

Present—Messrs. Bell, Bird, Brew, Bucklee, Deane, J. B. Edwards, George Edwards, Hanbury, Keeling, Macfarlan, Meggeson, Moore, Morson, Peacock, Sandford, Smith, Squire, and Waugh, the following were elected

MEMBERS.

Bredon .....Wilkes, David
Canterbury .....Amos, David
Croydon.....Long, Henry
Edinburgh.....Stephenson, John B.
Liverpool.....Hingston, Andrew Holland
Ryde, I. W.....Dixon, Henry

MAJOR EXAMINATION, *January 16th.*

Boucher, John .....Belper

MINOR EXAMINATION.

Gill, Levi John .....Bridport
Green, James.....Bath
Mercer, Nicholas .....Liverpool
Robinson, William Pickard.....Liverpool

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	ADDRESS.
Badcock, Henry	Mr. Peat	Lymington
MacGeorge, William	Mr. Carruthers	Dumfries
Rayner, Gilmour George	Mr. Brend	Swansea
Soole, Seymour Henry	Mr. Jessopp	Bishop's Stortford

ELECTION OF THE COUNCIL.

The Lot having been taken, was declared to have fallen upon

Edwin Ballard, Farringdon
John T. Davenport, 33, Great Russell Street, Bloomsbury
Henry Deane, Clapham
George Edwards, Dartford
George Meggeson, 61, Cannon Street, City
James Lodge Moore, Craven Street, Westbourne Terrace
T. N. R. Morson, 38, Queen's Square, Bloomsbury

Who will therefore remain on the Council during the ensuing year.

PHARMACEUTICAL MEETING,

Wednesday, February 3rd, 1858.

MR. JACOB BELL, PRESIDENT, IN THE CHAIR.

The minutes of the last meeting were read.

A simple apparatus for moistening labels and postage stamps was on the table.

The Chairman stated that the special business of the evening was to consider and discuss

THE REPORT
OF THE COMMITTEE ON THE "SALE OF POISONS BILL."

The Committee have carefully considered the subject referred to them, and deeming it desirable to obtain statistical information as to the real or principal sources of danger at present existing in the unrestricted sale of poisons, as well as to ascertain the special requirements and traffic of particular districts, and to prevent improper or injurious interference with the legitimate wants of the public, commenced their proceedings by issuing a series of questions to the Members of the Pharmaceutical Society both in town and country.

The answers to these questions have been arranged and very fully deliberated upon, many valuable facts and suggestions being contained therein. The Committee cannot forbear to notice the very prominent expression of opinion, *that*

the proper education of the Vendors of poisons will alone ensure the desired object of public safety: in this opinion the Committee most fully concur, as, indeed, they think all must who take the trouble to examine the *general* evidence as they have done.

Nevertheless, it being the declared intention of the Government to legislate on the subject during the present session, and the "Sale of Poisons Bill" having been submitted to the consideration of the profession and the public with this view, the Committee thought it advisable to take that Bill as the groundwork of their report, noting which portions appear to be judicious and which objectionable.

The Committee think it right to observe, that while endeavouring as much as possible to meet the views of the authors of the Bill, the only provisions of the measure to which they attach importance, and from which they believe the public will derive any benefit, are those which relate to the education and qualifications of the parties in whose hands the responsibility of the sale of poisons is to be entrusted. No system of registration or entry of the sale of poisons, and no regulations with a view to their distinction or safe custody, can be of any avail whatever, so long as poisons are allowed to be sold by parties who are not only ignorant as to their nature and properties, but many of whom can neither read nor write, and who are not in the habit of using labels of any sort. That this is not a merely hypothetical case is proved by the information obtained by the Committee from different parts of the country, which goes to show that, in addition to the imperfect qualifications of many who call themselves Chemists and Druggists, there are a large number of individuals who have never been educated as Druggists, and do not assume the name, but who, nevertheless, are in the constant habit of supplying certain poisonous drugs to the public. It appears from the tenor of the information received, that the public are fortunately ignorant of the nature and mode of employment of poisons in general as such, and the Committee doubt very much the policy of extending this knowledge by the publication of a long schedule of poisons, with various particulars of a suggestive nature, calculated to enlighten the criminally disposed in the accomplishment of his object; while, on the other hand, the chief security of the public consists in the discretion and intelligence of the qualified vendor of poisons, who in self-defence, as well as from higher motives, is constrained to adopt precautions which no Act of Parliament could define so completely as to constitute a safeguard equal to the moral responsibility now existing.

It is necessary to consider the several provisions of the Bill in their relation to each other, and the most difficult part of the subject is the Schedule of Poisons, upon which the nature and stringency of the regulations must depend. If, for example, the Schedule comprised only two or three poisons, such as arsenic, strychnia, and prussic acid, none of the restrictions which have been proposed would be attended with any practical difficulty or inconvenience, but in proportion as the list is extended, so as to comprise domestic medicines in daily use, and substances extensively employed in the arts and manufactures, the intricacy and impracticable nature of the provisions become obvious.

For example,—opium and laudanum are extensively sold by the pennyworth, and are used as domestic remedies by all classes, recommended by the Board of Health, and by medical practitioners, especially during the prevalence of diarrhœa and cholera. If it were compulsory in every sale to enter in a book the name and address of the purchaser and of a witness, the quantity sold and the purpose for which required, &c., the consequence would be either that the provisions of the Act being found impracticable would be disregarded, or that the poor, instead of submitting to the formality every time of purchasing a pennyworth when required, would be driven to the necessity of keeping a supply in the house, and thus the consumption and the danger would be increased instead of being diminished.

The same remark applies to oxalic acid and some other poisons, which in certain localities are sold in small quantities, for manufacturing or domestic purposes, to such an extent, that the entry of every sale in a book would be scarcely possible, and could answer no good purpose. On the contrary, the regulation would furnish, as with opium, an inducement to diminish the annoyance by purchasing larger quantities at a time, and experience has shown that this is one of the most common sources of accident. It is scarcely necessary to point out the practical absurdity of registering in the Poison Book every dose of antimony sold for a cold or fever. Moreover, the history of the very limited number of cases on record of criminal poisoning by antimony, shows that the parties chiefly involved in suspicion are members of the medical profession, who would be exempted from the operation of the Bill. The Committee therefore recommend the removal from the Schedule of the Poisons to which the objections above stated are principally applicable; but even with the list as thus limited, some of the proposed regulations and restrictions are deemed either impracticable, or calculated to increase, instead of diminishing, the danger of accidents.

The proposal to colour poisons with soot, indigo, or archill, would create one evil by avoiding another; for while the avowed object is that of distinction, the effect would be to confound all poisons together, whether strong or weak, their sensible characters being disguised by the colouring matter. This regulation, moreover, would be inoperative, as the section enacting it contains a proviso empowering the vendor to dispense with it at the option of the purchaser. The adoption of triangular blue bottles, and also tinfoil and gutta percha for poisons, could have no other object but that of inducing caution in the use of any articles contained in such bottles or such wrappers, and as the Act applies only to the so-called poisons in the Schedule, while a much larger number of very dangerous drugs are excluded from the operation of the proposed law, this intended distinction would be but an additional source of danger. The isolation of a certain number of poisons arbitrarily selected from among the list of deadly drugs, is another requirement calculated to defeat the object for which it is designed. A Chemist who is trustworthy and qualified for his business, requires no Act of Parliament to teach him how to arrange the bottles and jars in his shop, and an ignorant, incompetent person would be simply deluded and misled by an Act of Parliament directing him to concentrate all his care in the custody of the poisons enumerated in the Schedule, the other poisons (which constitute a very large majority) being subject to no precautions.

The requirement to label every poison with its proper name in conspicuous letters, not only in the shop and warehouse, but when sold, is a very proper one; but no Chemist regularly educated and brought up to the business would neglect this very essential rule, either with regard to poisons or drugs in general.

The most important provisions in the Bill are those which relate to the qualification of the vendors of poisons; but the appointment of a new Board of Examiners, in the manner proposed, is, in the opinion of the Committee, not only unnecessary, but particularly objectionable. The Examiners appointed under the 15 & 16 Vict., c. 56 (namely, the Pharmacy Act), are entrusted with the examination of candidates in all the branches of knowledge required for the exercise of the profession or business of a Pharmaceutical Chemist; and an enactment to the effect that after a certain date no persons except legally qualified Medical Practitioners or Pharmaceutical Chemists should be permitted to sell poisons without a licence, would have the effect of restricting the sale of poisons to duly qualified persons. A provision for the registration and licensing of all persons who should produce evidence that they were in business as Chemists and Druggists prior to the date of the Act, would secure to the present race of Chemists and Druggists the enjoyment of their existing rights and privileges;

and all persons in future entering the business would obtain the qualification of Pharmaceutical Chemists. If, however, it should be considered expedient, in opposition to the opinion of the Committee, to perpetuate a class of licensed dealers in poisons, by establishing an examination less stringent than the Major Examination of the Pharmaceutical Society, the existing Boards of Examiners now sitting in London and in Edinburgh are fully competent to perform this duty. It is scarcely necessary to point out what would be the effect of the appointment of a new Board of Examiners constituted as proposed in the "Sale of Poisons Bill," as it is obvious that a Board under the direct sanction of the Government, conferring a licence on a lenient examination and on payment of a comparatively small fee, would clash with, and sooner or later supersede, the Board of Examiners appointed under the Pharmacy Act, whose examination is more stringent, the fee higher, and the power limited to that of conferring an honorary title. After the persevering efforts of the Pharmaceutical Society for many years to promote the safety and welfare of the public, by raising the qualification of the vendors and dispensers of medicine, it is not too much to expect that such service will be recognized and appreciated; and a measure, the direct tendency of which would be to undermine the Society, by diverting the future dispensers of medicine into another channel, representing a lower qualification, would be a retrograde movement, and would have the effect of involving Pharmacy in confusion and difficulty. Such result would be no less injurious to the interest of the public than subversive of the progressive improvement which the Pharmaceutical Society has been steadily and successfully promoting from the time of its establishment.

The Committee beg to acknowledge the prompt and careful returns which have been received from the Members in general, and the thanks of the Society are especially due to those who have taken much pains in obtaining accurate statistical information, which will be of great value for future reference, and which has materially assisted the Committee in arriving at the conclusion above stated.

By way of introduction to the discussion of the Report, the CHAIRMAN briefly noticed the course the Committee and the Council had taken, and intended to pursue, in reference to the subject. On the occasion of a deputation of the Society waiting on Lord Granville, to remonstrate against some of the provisions of the proposed Sale of Poisons Bill, his Lordship inquired whether they were prepared with the heads of a measure which they could recommend as more likely to meet the requirements of the case, and less objectionable than the one under consideration. They replied that they were not at that moment in a position to offer a specific and definite Bill, but had no doubt that, after further investigation, they would be able to make some practical suggestions, calculated to facilitate and simplify legislation on this rather intricate and difficult subject. That investigation had taken place, aided by the answers furnished by the Members to a series of questions which had been circulated throughout the Society, and which contained valuable statistical and practical information. It was useless to find fault with every measure that might be proposed, and at the same time to suggest no definite and tangible mode of meeting the difficulties of the case. The Society professed to have practical experience, and therefore ought to be in a position rather to assist than retard the desired legislation. They would perceive by the Report that the Committee had spoken rather plainly in reference to the provisions of the Act which they thought objectionable, and had at the same time pointed out certain changes which they thought worthy of attention. The provision to which the Committee attached especial importance, was that which proposed to create a new Board of Examiners, which would have the tendency and effect of superseding the Pharmaceutical Society, by diverting candidates for qualification in Pharmacy into another channel. He thought it was not too much for them to expect to be more fully recognized as a Society than the Government Bill proposed to do. For years they had exerted

themselves to improve the position of Pharmaceutical Chemists, by introducing that system of education which the safety of the public required, and to establish an examination for Members, that had so far been approved, as to obtain legislative sanction. It was therefore not too much to expect, when the important subject of the sale of poisons was under the consideration of Parliament, that the Society, whose efforts had been directed for years towards the attainment of the object now in view, whilst Parliament had never before taken any trouble about it, and the medical profession had not done much to promote (but which that Society had for years studiously and perseveringly exerted itself to accomplish), should be fully recognized by Parliament, and not superseded by a Board of Examiners with licensing powers — composed of nominees of the Government, Members of the College of Physicians and Apothecaries' Company, with only one Member of the Pharmaceutical Society. Such a Board, though representing a merely nominal qualification, would assume in the eyes of the people an importance that did not attach to the certificates of qualification of a voluntary Society like theirs, which had no powers endorsed by the authority of Parliament, except that of conferring honorary titles. In whatever form, and to whom the proposed licence was to be granted, the parties obtaining it would no doubt write over their doors, "Licensed by the Government Board." The prestige attached to such an announcement (coupled with the fact that licences would be obtained with greater ease and less expense than passing the Society's examinations) would be the means of superseding them as an examining body, except in the isolated cases of a few individuals who aspired to distinguish themselves from other persons. The question for their consideration was, whether the Pharmaceutical Society was to be so superseded and annihilated. The cuckoo never builds a nest for herself, but finding that of other birds convenient for her purpose, displaces the eggs and deposits her own therein. The Sale of Poisons Bill proposed to deal with the Pharmaceutical Society in a similar manner, but he (the Chairman) felt satisfied the Pharmaceutical Chemists would not quietly submit to such treatment. The Pharmaceutical Society had for years been reiterating and endeavouring to instil into the public mind that some qualification was necessary in those who dealt in drugs and dispensed medicines. It had established a School of Pharmacy, with an efficient Board of Examiners, and it appeared that Parliament was adopting their principle and practice with regard to the examinations, and at the same time appointing a Board of Examiners that would divert candidates from the Society's examinations, and eventually supersede the Society altogether. It was an important question for their consideration, and one on which they ought not to yield. In any future interview that they might have with Lord Granville they would make that a primary point, because, if the Government adhered to the proposed constitution of the Board of Examiners, and would not yield or modify their decision on that point, it would be useless for them to discuss the other provisions of the Bill with the noble Lord. But, on the other hand, if they found the subject open to reconsideration, they would be ready then to discuss in detail the provisions of the Bill, and explain the views which their practical experience had led them to entertain upon the subject. It might probably be stated that the Pharmaceutical Society, which was only a voluntary society, ought not to be entrusted with the powers they asked of conducting the compulsory examinations of those who should in future deal in poisons; but, in anticipation of the possibility of such an objection, they had invited the inspection and courted the criticism of competent persons to prove that they might be safely trusted with such powers. The President and Censors of the Royal College of Physicians had repeatedly been asked to attend when the Board of Examiners were conducting their examinations, and they had also frequently expressed their willingness to have a Member or Members of the Royal College of Physicians present, either as visitors to witness the manner in which they conducted their examinations, or as examiners to assist them—and they had expressed their readiness to adopt any improvements that could be suggested, or modifications necessary in its constitution. He maintained there should be only one Pharmacy Board, as there was only one College of Physicians, one College of Surgeons, and one Apothecaries' Company, and he asked why all the power, usefulness, and influence the Pharmaceutical Society possessed should be discarded, and gradually destroyed by the establishment of a mixed board, of which it was proposed that only one member should be a Pharmaceutical Chemist. In 1815, when the Society

of Apothecaries asked for powers similar to those now sought for by the Pharmaceutical Society, no other body was appointed to draw away young men from these examinations. Previously to that they were merely a voluntary society, assuming honorary titles, but they were as competent to conduct examinations before they obtained their Act of Parliament, as they were after; and if the Apothecaries had adhered to their legitimate function, that of pharmacy, instead of treading on the heels of the physician by attending more to medical practice, they would have rendered unneccssary the establishment of any other Pharmaceutical body, and would have possessed greater powers than those now asked for by the Pharmaceutical Society. If it was thought right to grant them the powers they asked for, what objection could there be to grant now those demanded by the Pharmaceutical Society? The plan now under consideration for the establishment of examinations of all persons who deal in poisons, was one of the objects the Pharmaceutical Society had laboured to attain, but they wished it to be carried one step further by the enactment in Lord Granville's Bill, that none but legally qualified medical practitioners and Pharmaceutical Chemists should, after a certain date, sell poisons without a licence under the Act, which would give to those two bodies their legitimate rights, and to the public the security required. By the introduction of a clause that all Chemists and Druggists in business at the time of the passing of the Act should receive licences (and be recognized as the Apothecaries were in the passing of their Act), vested rights and interests would not be interfered with, and by that means, as the Chemists and Druggists died out, none but Pharmaceutical Chemists would in future sell poisons. In that way the interests of the public would be protected, and the objects which Lord Granville and the supporters of the Bill had in view, more completely attained, than by a vexatious interference with the internal management of the businesses of qualified persons, without at the same time placing those restrictions on ignorance which the nature of the case required.

Mr. Hooper said, there were very few substances that came exclusively under the hands of Chemists that could be called Poisons; and he had never yet seen a schedule of substances recognized by the Government that appertained to them. The greater portion of those named in the Schedule of the Bill, could not be recognized as Poisons from their connexion with the arts and the great extent to which they were used, and he was at a loss to see how any Bill could be brought forward that would especially affect them, except as to the use of opium. Almost all the metallic Poisons were used largely in the arts, and to place restrictions on Chemists and Druggists would have the effect of preventing them selling a pennyworth of sugar of lead, whilst an oilman might freely sell it by the cwt., and also arsenic, bichloride of mercury, bichromate of potash, &c. He thought the Government ought not to bear exclusively on the Chemist in the way proposed, and it was their duty to show them respectfully, but at the same time freely and plainly, the impossibility of practically carrying out such a Bill as that proposed.

Dr. Edwards (of Liverpool) said, that all who had heard the Report read, must admit that the subject had been entered into with great care, so as not to pledge the Society to any particular course, but with a strong desire to enter into the merits of the proposed plan of legislation so as to be able to act as circumstances might require. They must all feel indebted to the gentlemen who had devoted their time and ability to the general advancement of the profession and the interests of the public. They had had an enormous amount of labour to perform in going through the mass of answers returned to the questions they had forwarded to the profession relative to the subject under consideration, in order to arrive at the opinion of the body, the result of which they had embodied in the Report, which would, no doubt, receive the unanimous approbation of the Meeting: he proposed the following resolution—that,

"This Meeting having heard the Report of the Committee on the Sale of Poisons Bill, coincides with the opinion therein expressed, and desires to support the Council in the endeavour to obtain the proposed modifications of the Bill in the event of its being again introduced into Parliament."

The resolution did not pledge the Meeting to any particular line of conduct, but left the Council free to act as they thought proper; and as the Council had expressed a decided opinion against the restrictions proposed to be placed on the Members, and had given an express support to the principle of educating the vendors of

Poisons as the best guarantee to the public, he thought they might safely leave the matter in their hands. The Council had expressed a decided opinion with reference to certain substances named in the Schedule of Poisons, and that if any schedule was to be tolerated, it must be a very reduced one—opium and laudanum must be especially exempted from the proposed restrictions. The Council were prepared to deal with the Bill, and he thought they might safely leave the matter in their hands.

Mr. HOWARD seconded the resolution.

The CHAIRMAN said, the Council considered it impracticable to include in the schedule of poisons opium, laudanum, oxalic acid, and a few others, but in one part of the Bill they thought might provide that none but legally qualified medical practitioners and Pharmaceutical Chemists should sell laudanum, opium, tartarized antimony, salts of sorrel, oxalic acid, and chloroform, and in that way they would meet the views of the Government half way, and secure to the public the sale of these articles by those only who were acquainted with their nature. At the same time it was necessary they should be exempted from the restrictions of registration, &c., which would be exceedingly vexatious if carried out, especially in cases where persons wanted a pennyworth of laudanum for the toothache, &c. He thought that would attain the great object in view, for the returns from the country showed that four or five of the poisons he had enumerated were sold extensively by ignorant chandlers, some of whom were unable to read or write.

Mr. WAUGH observed, that in restricting the sale of the articles named to legally qualified Medical Practitioners and Pharmaceutical Chemists, it was not proposed to interfere with the business of legitimate Chemists and Druggists.

The CHAIRMAN said, he thought it was already fully explained and understood that it was proposed to place every Chemist and Druggist in business at the time of the passing of the Act on the register of persons licensed to deal in poisons. At the request of Mr. Collins he read the following amended schedule of poisons:—

SCHEDULE (A). Arsenic and its compounds, except pigments; corrosive sublimate; the poisonous vegetable alkaloids and their salts; prussic acid; cyanide of potassium; essential oil of bitter almonds, unless deprived of its prussic acid; cantharides; aconite and its preparations; nux vomica; coeculus indicus.

It was right to state that the Council were not unanimous as to the schedule, some considering that several of the substances ought to be excluded, but in a case of that kind some compromise was necessary, and when the Bill came before the public for further consideration, he thought it would be found that the suggestions, if adopted, would be a great improvement on the Bill emanating from the House of Lords.

A MEMBER asked, if they restricted the sale of poisons, as proposed, would it not be likely that those who dealt largely commercially in poisonous substances used in arts and manufacture, would oppose such a provision?

The CHAIRMAN said, the Committee were inclined to think the exempting clause would apply to those who sold poisons upon written order, in the ordinary course of wholesale dealing. The words of the exempting clause had been taken from the drafts of various Bills on the subject, and by adopting them, they should avoid the opposition of that class of dealers. It was proposed to grant licences to Chemists and Druggists in business at the time of the passing of the Act, the *onus probandi* being with them, on the payment of a small fee. They would then be identified commercially with Pharmaceutical Chemists, although not using that title, and their interests would harmonize.

Mr. COLLINS thought that the sale of poisonous articles ought to be entrusted to qualified persons, with no other restriction, than if they did a foolish or criminal act, they should be liable for it, and punished, as well as for acts committed by incompetent persons in their employ. That would be placing them in a position similar to medical men, who are liable to legal proceedings for incompetence or negligence in their practice.

Dr. EDWARDS thought corrosive sublimate, oxalate of potash, and oxalic acid, articles used by artisans, should be struck out of the schedule; for the manner in which such substances were generally purchased by them, could not be said to partake of a wholesale character. He considered corrosive sublimate and oxalate of potash ought not to be placed under restriction; for in certain districts, such as Bir-

mingham and Sheffield, they were constantly required by artisans, who worked at their homes, and purchased them for mixing, as the extent of their jobs required. The same applied to photography. He concurred in the opinion that they ought to oppose every Bill that did not require the sellers of poisons to be licensed, but he approved the restriction to the conducting of the business by properly qualified persons. England was the only country where the dealer in drugs did not undergo an examination of some kind, and it was a disgrace to the country it had been so long permitted. It was the principle of the Government of this country to yield nothing until it was clamoured for, and he urged on the Members to use their exertions to obtain the recognition of the examinations by the Pharmaceutical Society, and the power to grant a licence. A licence was required for the sale of patent medicines, but he thought it more required for the sale of poisons.

Mr. Compton rose to move an amendment, to the effect that it was desirable to obtain the abolition of the Patent Medicine Licence, and the substitution of a licence to dispense medicines, deal in drugs, &c., such licence being granted only to qualified persons. As it appeared to be the prevalent opinion that this proposition was foreign to the question immediately under discussion, the mover did not press it.

Mr. Squire, jun., thought the most effectual legislation for the subject would be to pass a Bill simply insisting on all Chemists and Druggists becoming Pharmaceutical Chemists ; that all Assistants, whose duty it was to dispense medicines, should be obliged to pass an examination. In the event of accident occurring through neglect or ignorance, the Chemist should be held responsible, in the same manner as the members of the medical profession. There were, however, many difficulties surrounding the question that he could not see his way clear out of ; and the more they considered them in connexion with specific legislation, the greater they became.

Mr. Macfarlan did not understand that the Society had committed itself to the principle of the Bill. The Bill proposed was such a one as they would hardly have expected to have emanated from so exalted a body as the House of Lords, except that, in consequence of their exaltation, they were entirely ignorant of the subject on which they were legislating—which he believed to be the case. Their Lordships had probably never entered a laboratory; certainly they had never discharged the duties of assistants in a Chemist's shop, or they would not betray so much ignorance on what they were legislating. It was contended, and generally admitted, that lawyers were better able to discuss proposed changes in the existing laws relating to the legal profession than unprofessional persons. Surely if that be so in a case like this, it was not too much to expect that persons who had spent their lives in the practice of their business should have something to say on the formation of laws for the regulation of their business; and their opinions should be respected in a matter that was not more for their interest than that of the public. If the original Bill had passed, it would have been a sad thing; for not a member of their Lordships' House, suffering from the pangs of tooth-ache, could have been relieved until such time as he could have produced evidence that he was a proper person to be trusted with a pennyworth of laudanum—or the Chemist had run the risk of incurring penalties named in the Bill, which were by no means slight; viz., the first a fine of £20, the second £50, and third, deprivation from carrying on his business afterwards. The ostensible object the Government had in view was the prevention of accidental and criminal poisoning. There were so many means for committing the latter, that philosophers had long since given up attempting it, and there were as many difficulties surrounding the former. The greatest security that could be afforded, would be to better professionally educate the vendors of poisons.

Mr. Hooper observed, that the Bill provided that Chemists should not sell poisons of a certain description, except to qualified medical practitioners, but the difficulty was how a Chemist was to know such persons when they entered his shop. The writing a prescription or giving a certain name or address was not a sufficient proof of his being so. He had had members of the legal profession come into his shop and write certain prescriptions with as much ease as a legally qualified medical practitioner.

The Chairman said, any person acting in that way would be liable to a charge of obtaining the articles under false pretences. Proof of a Chemist having been deceived would be a sufficient exoneration.

Mr. Hooper—But suppose I can't catch him, my reputation is sacrificed by him.

Mr. Waugh reminded the meeting that no one would lose his reputation by strictly adhering to the letter of an Act of Parliament. To refuse a Medical Practitioner under such circumstances, would rather tend to raise a Chemist's reputation.

The Chairman said, he had sometimes refused to supply Medical Men with poisons from their being unknown to him.

After some further remarks from other Members, the resolution was put and carried, with only one dissentient.

The Chairman informed the meeting that the Committee of the Council was not dissolved, but had the subject still under consideration, and were prepared to take all necessary steps for carrying out the views of the Society. As soon as occasion required they would again call the Members of the Society together and take their opinion. At the next meeting, the first Wednesday in the month, some scientific papers would be submitted to the meeting.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The usual fortnightly meeting of this Association was held on January 28th, the Royal Institution, Colquitt Street,

THE PRESIDENT, H. S. EVANS, ESQ., IN THE CHAIR.

Mr. Maxwell, of Berry Street, proposed by Dr. Edwards, was elected a Member.

The following donations were acknowledged by the Secretary:—From Mr. Wright, two parts of Muspratt's *Chemistry*. From Messrs. Jackson and M'Culloch, a specimen of Cardamom, from Bombay. From Mr. Allen, a specimen of Australian Wheat. From Mr. Redford, a specimen of *Myrica Cerifera; Sanguinaria Canadensis*, or Blood Root. Powder of Blood Root, from the Secretary, Mr. Shaw. A Cotton Plant, grown in Seacombe, by Mr. Edlington, from Egyptian seed given by Mr. Holt.

The President introduced a new Water Filterer, which consisted of a ball of porous charcoal having a small pipe introduced; and this being attached to the water supply allows the water to pass through the porous mass of charcoal, or being introduced into the service pipe at the bottom of the cistern the water filtered through it. However perfect the separation of mechanically suspended impurities, it had no effect upon the dissolved impurities as stated by the patentee.

A paper, entitled the "History of Tea," was then read by the President. Having noticed the Chinese tradition, that tea was the production of a devout man's eyelids, cut off by him in a fit of devotion, he stated that tea was first introduced into this country in 1610. In 1660, every gallon of tea consumed in coffee-houses and public-houses was subject to a duty of 1*s.* 6*d.* It was an importation from the Continent, and a package of 2 lb. was a fit present for a monarch of this country. For many years tea was only used by the higher classes; and, being sometimes as high as 60*s.* per pound, was even with them a luxury. In 1607, 5000 lbs. were imported into this country; while at the present time it must be nearly 76,000,000 lbs. In describing the manufacture of tea, he stated that the beautiful bloom on tea so much admired in this country was artificial. The Chinese paint their tea to suit their customers; and he feared the art of tea-painting was not unknown in this country. The varieties of tea, their peculiarities of manufacture, and quantity consumed, were afterwards mentioned by the President.

A conversation ensued, after which a vote of thanks was tendered to Mr. Evans for his paper. The proceedings then terminated.

Thursday, 11*th February.*

DR. EDWARDS IN THE CHAIR.

Mr. Thomas Gartley, Mr. Durandu, and Mr. Arnott were elected Members of the Society.

Mr. Holt presented to the Society a specimen of the Bread Fruit (*Musa Cavendishii*, Paxt.), grown by Mr. John Edlington, gardener at Winch House, Seacombe.

The following donations were also announeed:—Speeimen of the Scammony Root, from Professor Archer; and a specimen of the Rice Plant, from Mr. English.

Mr. Newton Samuelson, F.C.S., then read the paper for the evening, "On the Metallurgy of Tin." After some introductory remarks, Mr. Samuelson entered upon the history of the metal, and enumerated the loealities in which it is found. He then deseribed the eleaning, smelting, and refining proeesses, following the various operations from the first preparation of the erude ore to the delivery of the refined metal for disposal in the market; and in so doing, he entered into the various details eonneeted with the construction of furnaces for smelting, and the different expedients resorted to for the purpose of freeing the metal from silieious matter, pyrites, and wolfram. In connexion with the last named, the leeturer explained the ehemieal proeess employed, and patented by Mr. Oxland. This portion of the paper also treated of the eontinental proeesses for smelting and refining, and was illustrated by large clear diagrams, which were aeeurately explained by the leeturer; indeed, the whole description was characterized by explieitness of detail, and presented evidence of careful observation. The salts and most important alloys next engaged attention. Of the former, the protoxide, sesquioxide, peroxide (or binoxide), protochloride, bichloride, bisulphide, and purple of eassius, were fully described, and their manufacture and uses explained. In regard to the alloys, special reference was made to tin plates, and the process by whieh they are prepared. The concluding portion of the paper was occupied with an aecount of the principal methods of assaying tin ores in the furnace, as well as by ehemieal analysis; and it was obvious, from the facility and perspicuity with which Mr. Samuelson deseribed the humid process of Klaproth, &c., as well as the methods of assay employed in Cornwall and elsewhere, that his information was not merely derived from print, but was the result of long practieal experienee.

The leeture was well received by an attentive and intelligent audience, and a vote of thanks was aeeorded to him for his highly instructive and praetical paper.

Dr. Edwards communicated the report of a Committee of the Pharmaceutical Society. The Committee proposed to limit the Sale of Poisons to Pharmaceutical Chemists, and Chemists and Druggists now in business. The Schedule of Poisons was redueed to a few very powerful poisons, the sale of which must be registered. No restrietions were proposed on the sale of such medieines as laudanum, chloroform, and tartar emetie, but they were to be sold only by parties licensed by the Pharmaeeutieal Soeiety, and not by small shopkeepers who were ignorant of the nature of drugs. The Committee believed that if the sale be restricted to eompetent parties, the regulations with respect to labelling and preservation were quite unnecessary. The Report would be eommunicated to the Lord President, who had eharge of the Bill. This eoneluded the proeeedings.

ORIGINAL AND EXTRACTED ARTICLES.

REPORT OF THE
RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,
AND OF THE
APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

BY B. H. PAUL, Ph.D.

(*Continued from p.* 428.)

Atomic Weights of Elementary Substances.—Prof. Rose* has published some remarks on this subjeet, which, just now, are of espeeial interest. He eommenees by pointing out the caution with which Berzelius proceeded in determining experimentally the atomie weights, and the attention which he paid to any eireumstanees that might influence the results obtained. This was instanced subsequently by the fact, that when Dulong and Petit established the law that the specific heat of elementary substances, espeeially the metals, is inversely proportionate to their atomic weights; the numbers which had been fixed upon by Berzelius, as representing the atomic weights of the metals he had examined, did not require to be altered,

* *Annalen der Physik und Chemie*, c., 270.

with the single exeeption of that for silver, whieh, to conform with the law, required to be halved. The accuracy of the atomic weights fixed upon by Berzelius was still more confirmed by Mitscherlieh's investigation of the phenomena of isomorphism, which furnished an admirable means of reeognizing eompounds of similar atomic constitution.

In determining the atomie weights, Berzelius was guided prineipally by the analogies existing between the oxides; and hence arose the advantage that thosc oxides, chlorides, sulphides, &c., of the several elementary substanees, whieh are similar in their chemical relations, ean, by his system, be classed togcther in groups, according to their atomic constitution. Sinee, in experimental sciences generally, and especially in chemistry, analogy is often the safest guide in difficult invcstigations, it is important, in establishing a theory, not to run counter to it without the most urgent necessity. If this principle is not observed, a ehaotic state is introdueed, whieh is especially detrimental in chemistry, on aecount of the rapid aceumulation of new facts.

After the atomic weights determined by Berzelius had beeome almost universally adopted, L. Gmelin suggested several alterations. He assumed, as a fundamental proposition, that the atoms of elementary substanees must combine in the most simple proportions; that no elementary substance could have an atomic weight smaller than that whieh it was actually found to have in compounds, and sinee no compounds of hydrogen or of nitrogen, as well also as of chlorine, bromine, or iodine, were known, in which these substances would be combined in simple atomie proportions, aecording to the atomic weights assigned to them by Berzelius, he doubled the atomic weights assigned to those substances by Berzelius. He also went further, and altered, in like manner, the atomie weights of phosphorus, arsenie, antimony, and bismuth.

These changes were approved and adopted, not only in Germany, but in other countries. Some chemists went so far as to double the atomic weight of aluminum. Others, again, adhered to the atomic weights as determined by Berzelius, and in this way a certain degree of confusion was produced.

At first sight there would appear to be little that eould be urged against doubling the atomic numbers adopted by Berzelius for hydrogen, nitrogen, ehlorine, bromine, and iodine. These elementary substances do not appear to eombine in simple proportions. Still, the isomorphism of perchlorate of potash and permanganate of potash, renders it extremely probable that we must assume the existenee of a double atom of chlorine in perchloric acid, since there is no question that there is a double atom of manganese in permanganic aeid. Although like crystalline form does not always indicate analogous constitution, since substances of the same and similar forms may sometimes differ widely in constitution, still it is unquestionable that salts which present like forms, which can replace each other in all proportions and erystallize together, have an analogous chemical eonstitution. This has been proved to be the case, with regard to the perchlorate and permanganate of potash, by Wöhler.

But Gmelin's proposition to double the equivalents whieh Berzelius had adopted for phosphorus, arsenie, antimony, and bismuth, involved contradictions whieh might have been pereeived at once. By this proceeding, the analogy between the eompounds of these substanees with oxygen, and other similar oxides was destroyed; so that even upon this ground the proposition of Gmelin should have been opposed.

The acid or basie character of oxides of elementary substances are mainly dependent upon two eireumstanees, as Prof. Rose has hitherto* endeavoured to prove, viz.:—

1. The chemical nature of the elementary substanee; and,
2. The number of atoms of oxygen in the oxide.

The extent to which the chemical nature of elementary substances determines the acid or basie character of their oxides is evident, from the fact that none of the nonmetallie elements yield an oxide which can with eertainty be regarded as possessing strong basie eharaeters, however small may be the number of oxygen atoms.

With regard to the influence of the number of atoms of oxygen, it may be taken as an invariable rule, that when an elementary substanee eombines with oxygen in several proportions, and produces several basic oxides, that one whieh contains the smallest number of atoms of oxygen is the strongest base. In proportion as the number of oxygen atoms inereases, the basie characters of the oxides deerease, and

* *Annalen der Physik und Chemie*, lxxxiii., 132.

they present successively the characters of weak bases, of weak acids, and, lastly, of strong acids. In like manner, the oxides of an elementary substance, whose highest oxide is a strong acid, present successively the characters of weaker acids, of weak bases, and, lastly, of strong bases in proportion as the number of oxygen atoms is less. These relations are especially illustrated by the oxides of manganese, of iron, and of chromium. There is only one elementary substance—carbon—whose highest oxide—carbonic acid—is a weaker acid than other carbon acids containing fewer atoms of oxygen. This is, however, the sole exception to the generality of the law.

According to Berzelius's view, the several acids and the basic oxides of the elementary substances may be arranged according to their atomic constitution in groups, the members of which resemble each other more or less in chemical characters, the differences between them being determined especially, perhaps, by the chemical nature of the elementary substances which they contain. This mutual dependence of analogous chemical constitution, and of analogous chemical characters, facilitates greatly the formation of general views, and has a great influence upon the advancement of chemical science.

However, by adopting the atomic weights proposed by Gmelin for many elementary substances, this analogy is entirely lost sight of, and a discordance introduced, which may best be illustrated by the oxides of arsenic, antimony, and bismuth. Prof. Rose would separate these elementary substances from phosphorus, which, as a non-metallic substance, by its combination with oxygen in all proportions produces only acids. The above-named three substances belong to the class of electro-negative metals, and produce, in their highest state of oxidation, acids. Their lower oxides present the characters of weak acids, and may act as bases. The lowest oxides of these metals are but little known; suboxides of arsenic and of antimony appear to exist, and their most important character is that of being readily convertible into metal and a higher oxide.

According to some experiments by Bonsdorf,* 100 parts of arsenic, in producing suboxide, combine with 11 parts of oxygen, or one atom of oxygen with a double atom of metal. This suboxide has, therefore, the same constitution as the suboxides of copper, mercury, and lead; which also resemble it in being readily convertible into metal and a higher oxide. But, according to Gmelin's view, the atomic constitution of these oxides would be represented by AsO and SbO. Thus they are brought within a group of metallic oxides, which, in their relations to other substances, evince a far greater stability, which readily combine with acids producing salts, and of which very few can be converted into metal and a higher oxide, except under special conditions.

Of the higher oxides of these metals, containing three atoms of oxygen, arsenous acid is a very weak acid, and it occupies the place of a base in some compounds; as, for instance, with tartaric acid, &c. Antimonous acid is a still weaker acid; and, as it generally takes the place of a base, is more correctly called oxide of antimony. But it is in all cases a weak base, and, like all other weak bases, forms double salts only with the salts of stronger bases, these double salts sometimes presenting a well-defined crystalline form; as, for instance, the tartrate of potash and antimony. Oxide of bismuth scarcely presents any of the characters of an acid; but, as a base, combines even with weak acids, such as carbonic acid.

According to Berzelius's view, these oxides belong, in conformity with their atomic constitution, to a group of metallic oxides, which present the characters of weak bases, and may in some cases occupy the place of weak acids. But, on the whole, these oxides present more decidedly the characters of weak acids, owing to the electro-negative character of the metals they contain. Nevertheless, Gmelin must, in conformity with his view of their atomic constitution, have classed these oxides with others which present the characters of very strong acids. Not to place them in comparison with sulphuric and selenic acids, which, as oxides of non-metallic elementary substances, present much more decided acid characters than metallic oxides having the same constitution, still they are so far inferior in the characters of acids, to chromic acid and other metallic acids, that it appears extremely unnatural to class them together with these substances in one group. The very marked acid characters of metallic acids which have a constitution similar to that of sulphuric acid, such as manganic acid, and more especially ferric acid, cannot be

* *Annalen der Physik und Chemie*, xli., 300.

distinctly recognized, only because they are very readily decomposed, a character which does not appear to be in any way connected with their being strong acids.

It might indeed be urged against Berzelius's view that acids which, in the wet way at least, are among the weakest known—boracic and silicic acids—have a constitution analogous to sulphuric acid. But it must be remembered, that with regard to the true atomic weights both of boron and silicium, there is still too much uncertainty to admit of this objection having any great weight.

From the comparison of the oxides of arsenic, antimony and bismuth, which contain three atoms of oxygen, with the highest oxides of sulphur, selenium and chromium, it is also evident that the weak acids which the non-metallic elementary substances, nitrogen and chlorine, form with three atoms of oxygen, cannot, with any greater reason, be classed with sulphuric acids and its analogs, as must be done according to Gmelin's view. For hyponitrous acid is so weak an acid that it can be displaced from its compounds with bases, by weak acids. Moreover, it forms with sulphuric acid a compound—which plays an important part in the preparation of sulphuric acid by the English method—in which it must be regarded as occupying the place of a base. Taking into consideration all these grounds, it appears evident that there are the best reasons for assuming simple atoms of nitrogen, chlorine, bromine and iodine, and that analogy is seriously damaged by doubling these atoms.

The principal reason which induced Gmelin to double these atomic weights, was the assumed principle that no smaller atomic weights should be adopted than those which are actually observed. Those chemists who follow him in this respect must necessarily be embarrassed if compounds are discovered, in which there is no alternative but to adopt the simple atomic weights. This case has actually occurred. Even Gmelin himself might have foreseen it. A sulphide of arsenic—realgar—has long been known, containing only two-thirds as much sulphur as orpiment, which corresponds with arsenous acid. The existence of this sulphide rendered it probable that there might be a corresponding oxide. As yet, however, no such oxide either of arsenic or antimony has been obtained, although a corresponding oxide of bismuth has been obtained. Schneider has succeeded in preparing* a suboxide of bismuth, in which a simple atom of the metal is combined with one atom of oxygen. This oxide is a salifiable base, though it has not yet been combined with any strong acids, being decomposed by them into metal and a higher oxide. However, it may be ignited, in the absence of oxygen, without being decomposed. This oxide, therefore, belongs to the large series of basic oxides, consisting of one atom of metal and one atom of oxygen. It has the greatest similarity to suboxide of tin. Both oxides belong to the group RO, owing to the electro-negative nature of the metals. These two oxides are the only ones of the group to which they belong that are decomposed under certain conditions, into metal and a higher oxide. The suboxide of bismuth suffers this decomposition under the influence of strong acids; the sub-oxide of tin under the influence of an excess of caustic potash solution. They resemble, in this respect, the suboxides of copper and of mercury, which belong however, to another group of oxides, 2 R+O, and which are decomposed in a similar manner; the former by acids, the latter by alkalies. The adherents to Gmelin's view must regard the constitution of this oxide as $Bi\ O_2$. But then it would fall within the group comprising binoxide of manganese, brown oxide of lead, stannic acid, and titanic acid. There could scarcely be any greater inconsistency with all rules of analogy than this. The latter oxides are either acids, or they cannot always present the character of acting as acids, only because they contain a portion of their oxygen so loosely combined, that it is readily separated under many circumstances. The suboxide of bismuth combines with stannic acid, producing a saline compound, in which the former is the base, and this, according to Gmelin's view, would have the same constitution as the acid with which it is combined.

There are few oxides which present so many points of resemblance in their compounds as alumina and peroxide of iron, which are perfectly isomorphous, and can replace each other in all proportions. Consequently the atomic weights of iron and the metals analogous to it, might be altered with as much justice as that of aluminum, especially as it is not improbable that there is a lower oxide, or a lower chloride of aluminum.

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* *Ann. der Physik und Chemie*, lxxxviii. 45.

If, however, analogy is not to be adopted as a guide in determining atomic weights, and alumina is to be regarded as having an atomic constitution analogous to that of chromic acid and not to that of chromic oxide, with which it is isomorphous, with which it has so many characters in common, and which has the same atomic volume as alumina, it would be more logical to adopt Dalton's view, that the elementary substances combine most readily in equal atoms ; and that when only one compound of two elementary substances is known, it is to be regarded as consisting of one atom of each elementary substance. Indeed, there is less reason for opposing the view that alumina consists of one atom of aluminum and one atom of oxygen, than there is for opposing the view that it contains one atom of metal and three atoms of oxygen.

Besides these chemical reasons for preferring the atomic weights adopted by Berzelius to those suggested by Gmelin, there are also physical reasons which are not less weighty. Dulong and Petit first endeavoured to show that the specific heat of elementary substances is inversely as their atomic weights, or in other words, that atomic weights of these substances had equal specific heat. Regnault has confirmed this law by a long series of experiments, and has unquestionably proved that though the specific heat of a substance may vary according as it is in the solid or liquid, and especially the gaseous condition, still that in the case of solid elementary substances, which have in other respects the same physical condition, the product of the specific heat into the atomic weight varies between 38 and 41, the atomic weight of oxygen being taken as 100, and further, that the variations between these limits are dependent less upon the errors of experiment and observation, than upon the circumstance that the capacity for heat of substances, as determined by experiment, contains foreign elements which it has not hitherto been possible to eliminate. Moreover, the elementary substances, in different allotropic conditions, have somewhat different specific heat. Hence, it is probable that it will never be possible to correct the atomic weights by means of this law, although it may be very advantageously applied in deciding upon the atomic weights when there seems to be equal chemical grounds for adopting several different atomic weights for any particular elementary substance.

Prof. Regnault's investigations have proved that this law obtains for all the elementary substances examined by him, when in a solid state, with the exception of silver, the alkaline metals, and carbon, when the atomic weights assigned to these substances by Berzelius are adopted. This is especially the case with phosphorus, arsenic, antimony, bismuth, and aluminum. The numbers obtained for antimony and bismuth approximate still nearer to those obtained for other elementary substances, when the specific heat determined for them respectively by Prof. Regnault, is multiplied by the corrected atomic weight of these metals recently determined by Dr. Schneider. Prof. Regnault has also determined the specific heat of iodine and bromine in the solid state, and the numbers which he has obtained by multiplying these results with the simple atomic weights assigned to these substances by Berzelius, correspond so well with the similar products obtained for other elementary substances, that there can be no further doubt that the equivalents of chlorine, bromine and iodine, represent double atoms of these substances.

In Neumann's investigation* of the specific heat of compound substances, he found, especially in reference to certain native carbonates and sulphates, that the specific heat is the same for equal atoms. Prof. Regnault has also confirmed these results, and has pointed out that it is only in consequence of different degrees of condensation of some oxides that differences present themselves in this respect. But he showed that, among others, peroxide of iron and arsenous acid, chromic oxide and oxide of bismuth, which, according to Gmelin's view are dissimilarly constituted, have the same specific heat, when the atomic weights assigned to them by Berzelius are adopted.

Dulong and Petit observed that the number obtained by multiplying the specific heat of silver into the atomic weight assigned to it by Berzelius, was twice as great as those obtained for other elementary substances. Prof. Regnault has confirmed this observation. There are, moreover, many other reasons for dividing the atomic weight of silver. Prof. Rose has already pointed out† that the composition of grey

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* *Ann. der Physik und Chemie*, xxiii., 1. † *Ibid.*, xv., 585.

copper ore can be accounted for only by regarding the sulphide of silver as having an atomic constitution analogous to that of sulphide of copper, Cu_2S.

Prof. Regnault has also found that the same fact applies to the alkaline metals, as to silver, so that for this reason the atomic weights hitherto assigned to potassium, sodium, and lithium, should be halved.* This is rendered probable also by several other reasons. If the principle of the basic character of the several oxides being determined, not only by the nature of the metal they contain, but also by the number of oxygen atoms they contain, is regarded as correct, it follows that the alkalies, which are unquestionably the strongest bases, contain the smallest number of oxygen atoms that can combine with a metal. Those oxides, with regard to which this can be assumed with certainty, contain two atoms of metal and one atom of oxygen. This group would comprise, besides the alkalies, oxide of silver, suboxide of mercury, suboxides of copper, lead and gold. The three latter have a strong tendency to separate into metal and a higher oxide, and owing to this circumstance, the possibility of their acting the part of strong bases is masked. Prof. Rose has previously investigated this character.† The suboxide of mercury undergoes this change in the presence of bases; the suboxide of copper in the presence of acids. For this reason the oxygen salts of suboxide of copper are little known, while there is a well defined series of oxygen salts of suboxide of mercury, in which this oxide takes the part of a strong base.

It has long been known that potash is isomorphous with oxide of ammonium; these bases can replace each other in all proportions in salts, as, for instance, in the alums. But according to the view of Berzelius, oxide of ammonium would contain two atoms of ammonium, combined with one atom of oxygen.

Assuming the existence of two atoms of metal in the alkalies, the constitution of the higher alkaline sulphides would cease to appear so remarkable as it does at present. There are no other instances of the combination of one atom of one elementary substance with five atoms of another, although there are instances of the combination of two atoms of one with five or seven atoms of another. In like manner the constitution of the superoxides of the alkaline metals would cease to appear unusual if they were regarded as containing two atoms of metal.

Moreover, the opinion that there are two atoms of metal for one of oxygen in the alkalies, is supported by the isomorphism of several salts of soda with those of silver. Prof. Heeren‡ first showed that the hyposulphite of soda with two atoms of water has the same crystalline form as the hyposulphite of silver having the same constitution. Prof. Mitscherlich§ afterwards observed that this is also the case with anhydrous sulphate of soda and anhydrous sulphate of silver, as well as with selenate of soda and sulphate of silver. Prof. Regnault‖ has already pointed out that no alkaline salt is known to be perfectly isomorphous with a corresponding salt of an oxide having the constitution RO, and that in no case do the alkaline oxides replace, in indefinite proportions, an oxide having that constitution. It is true that mineralogists assume, in many instances, the isomorphism of lime and of soda, but this is done only for the sake of accounting for the composition of certain minerals —for instance, chabasite and other zeolites. No salt has ever been prepared artificially in which an alkali can be replaced by an oxide having the constitution RO.

It is remarkable, that while so many chemists followed Gmelin in altering the atomic weights of many elementary substances without adequate grounds, there were few who would venture to make any alteration in the atomic weights of silver and of the alkaline metals, for doing which there were so many important reasons. Many have perhaps been deterred from doing so by the fact that oxide of silver loses its oxygen at a heat below redness, and were therefore unwilling to class it together with the alkalies in one group, since these oxides are so difficultly reducible. But it should be remembered that the greater or less affinity of metals for oxygen in the several oxides, has no manner of relation to the character of those oxides to act as strong or weak bases.

It must, however, be mentioned that there is another objection which may be urged against altering the atomic weight of silver, and which is very deserving of consideration. If the atomic weight of silver is halved, it becomes necessary to assume that in suboxide of silver—the existence of which is beyond question—there

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* *Ann. der Physik und Chemie*, iii., 251, and xcviii., 307.
† *Ibid.*, lxxxiii., 151.
‡ *Ibid.*, vii., 200.
§ *Ibid.*, xii., 138.
‖ *Ibid.*, lxxvii., 103.

are four atoms of silver combined with one atom of oxygen, a constitution which is quite unusual, and for which there is no analogy. Still Prof. Rose thinks that this reason is not sufficiently important to stand in the way of the alteration; for when a compound of unusual constitution is discovered, this is to be held questionable until other analogous substances are obtained. Thus when Stadion showed that perchloric acid contained seven atoms of oxygen, Berzelius considered himself justified in assuming that it contained only six atoms, because he was unable to bring the number given by Stadion into accordance with the law of definite simple proportions. But subsequently, by the discovery of periodic and permaganic acids, the singularity of the constitution assigned to perchloric acid by Stadion disappeared.

In determining the atomic weights, Berzelius proceeded from the very probable and natural assumption, that equal atoms of the several elementary substances have, in the gaseous state, the same volume. Consequently, equal volumes of oxygen and of hydrogen, or of nitrogen, under equal pressure, and at the same temperature, would contain an equal number of atoms.

If this view is correct, it follows, that since, in regard to elementary gases, the terms atom and volume are synonymous, equal volumes will contain, under equal pressure, and at the same temperature, equal quantities of heat—or, in other words, they will have the same specific heat. This had already been asserted by several; but it is only recently that it has been, to some extent, demonstrated by Prof. Regnault,* in the case of the permanent elementary gases oxygen, nitrogen, and hydrogen. Since, therefore, the specific heat of these elementary gases is, as in the case of solid elementary substances, inversely proportionate to their simple atomic weights, this is a further reason why the atomic weights of hydrogen and of nitrogen should not be doubted.

In the case, however, of these elementary permanent gases, the specific heat, or the product of the specific heat, into the atomic weights is different from that of the solid elementary substances. It varies between 24 and 23.59, thus deviating greatly from the number 40, which the latter give. As this is rather more than half that obtained for solid elementary substances, Gmelin considered that it might be regarded as a reason for opposing Berzelius's view, and that it seemed to show, that two volumes of nitrogen or hydrogen, instead of one volume, corresponded with an atom of these elementary substances. But oxygen has the same specific heat as the other elementary permanent gases, and one volume of this gas corresponds with one atom. The liquifiable gases, chlorine and bromine vapour, give a higher number, a higher specific heat in the volume, viz., 29.64 and 30.4. Moreover, it follows from Prof. Regnault's investigations, that it has not hitherto been possible to recognize and to eliminate all the foreign influences which are exercised in experimental investigations relating to the specific heat of vapours. When compound gases, which do not belong to the class of easily liquifiable gases, are produced by the combination of gaseous substances without condensation, these gases should present the same characters as permanent elementary gases, and they should, like these, have for equal volumes the same specific heat. Prof. Regnault has found this to be the case, for those compound gases which conform only to some extent with Mariotte's law, such as nitric oxide, hydrochloric acid gas, and carbonic oxide gas. Of these gases it is only nitric oxide whose two constituents belong to the group of permanent elementary gases. In hydrochloric acid gas the chlorine does not present those anomalies that it does in a free state; but by its combination with hydrogen it has become far less readily liquifiable. However, the fact that carbonic oxide has, for equal volumes, the same specific heat as the permanent elementary gases, is still more important. Though carbon is not known in the gaseous state, the density of carbon vapour has been calculated from the atomic weight of carbon by Berzelius, and it would appear from the above-mentioned fact, that this calculated result is correct. Prof. Regnault was not formerly able to determine with certainty the specific heat of carbon in its different allotropic conditions, and his experiments led him to the opinion that carbon does not conform with the general law relating to the connexion between specific heat and atomic weight. Thus, for instance, the specific heat of diamond was found to be much less than that of other kinds of carbon, the difference being of such an amount as was not observed in the case of other solid elementary substances, in their different allotropic conditions.

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* *Relation des Expériences, &c.*, 1856, ii., 299.

Berzelius's view, that a volume of an elementary gas represented an atom, was long since opposed by the English chemists. Following Thomson's view, they considered that in two volumes of nitrogen or of hydrogen, there was only as many atoms as in one volume of oxygen. This opinion, for which no satisfactory reason can be given, originated probably with Dalton, who in constructing his atomic theory, assumed as a fundamental proposition, that substances combine with each other most readily in such proportions, that one atom of an elementary substance combines with one atom of another, and consequently, that water consists of equal atoms of oxygen and hydrogen. This view was not at first received by continental chemists, all of whom adopted Berzelius's view, until Dumas showed that sulphur vapour is three times as dense, and phosphorus vapour twice as dense as it should be in accordance with Berzelius's view. These observations of Dumas were confirmed by Mitscherlich, who found also that arsenic vapour, like phosphorus vapour, is twice as dense as it had hitherto been assumed to be.

In the first instance, Berzelius's view was so universally regarded as correct, that Dumas proposed to double the atomic weight of phosphorus, and to treble that of sulphur, thus regarding phosphoric acid as consisting of one atom of phosphorus combined with five atoms of oxygen, and sulphuric acid as consisting of one atom of sulphur combined with nine atoms of oxygen. But since the latter assumption appeared too hazardous and remarkable, chemists gradually went over to the opinion that the volume of elementary substances in their gaseous state was not necessarily proportionate to their atomic weights; and at the same time it was assumed that the volume might contain a multiple or submultiple, by whole numbers, of the number of atoms.

Subsequent observations, especially those of Cahours and Bineau, have shown that the densities of the vapours of certain volatile compounds, as compared with that of atmospheric air, at different temperatures, and under different pressure, were not always constant, as had hitherto been supposed. The density of these vapours, at low temperatures, was found to be greater than theory indicated; and it was found to decrease as the temperature rose, so as gradually to approach the theoretical value. This fact can only be referred to a deviation in the case of vapours from Mariotti's law, and the law of expansion by heat. Such deviations have been directly proved to take place in the case of liquifiable gases, especially when they approach the point of liquefaction.

There appears to be no reason why it may not be assumed that such deviations take place likewise, in the case of the vapours of liquid and solid elementary substances. It would appear therefore probable that the elementary substances would, in all instances, be found to contain equal atoms in equal volumes of their gases, if it were possible to determine the density of those gases at very high temperatures, far removed from their point of condensation. In such a normal condition of density, so to speak, these gases might appear colourless, even when, in a state of greater density, they are coloured. In compound colourless gases they partake of such an absence of colour. We may therefore with justice assume, as Berzelius always did, that sulphuretted hydrogen and sulphurous acid gases contain, not one-sixth of a volume, but half a volume of sulphur vapour, combined respectively with one volume of hydrogen, and one volume of oxygen.

So far as research has yet gone, it remains quite uncertain whether there is any definite law in accordance with which liquid and solid elementary substances give vapours of greater or less density, at different temperatures, before they acquire, at very high temperatures, such a density as corresponds with their atomic weights. But it may be inferred that there is such a law, from the fact observed by Mitscherlich, that, at a temperature ranging from 980°.6 F. to 1423°.4 F., phosphorus and arsenic, which are in many respects analogous, give vapours, which have analogous densities, both being less than the density of sulphur vapour.

It is therefore admissible to adopt the opinion that equal volumes of the gases of all elementary substances contain an equal number of atoms, and thus recur to the original view of Berzelius. If this is done, and the atomic weights proposed by Berzelius are again generally adopted, chemical formulæ will gain the great advantage of expressing how many volumes of the elementary substances, in a gaseous state, are contained in the compounds they represent.

There is only one substance the density of whose vapour presents in this respect a striking and unaccountable anomaly; this is mercury—the gas-volume of which,

according to the corresponding observations of Dumas and of Mitscherlich, is only one half as heavy as it should be, according to its atomic weight. The above-mentioned hypothesis will account for a gas being denser than would be expected, in accordance with its atomic weight; but it is more difficult to perceive what may be the reason of its being less dense. It would certainly be precipitate, for this reason, to halve the atomic weight of mercury; for then the suboxide of mercury and the substances which have an analogous constitution must be regarded as containing four atoms of metal. Moreover, such an assumption could not be reconciled with the capacity for heat, which, according to Regnault, bears the same proportion to the atomic weight now assigned to mercury as that which obtains in the case of other metals. It is highly probable that in the case of mercury vapour, which is so easily condensible, the expansion coefficient is peculiar. The observations of Prof. Magnus, which correspond with those subsequently made by Prof. Regnault, prove that even carbonic acid gas, and still more sulphurous acid gas, have an expansion coefficient which is greater than that of atmospheric air. Moreover, mercury in very many of its characters stands quite apart from other metals. There is not one of the numerous crystalline compounds of mercury that is isomorphous with any analogous compound of any other metal, although in other respects the compounds of suboxide of mercury present a great resemblance to those of oxide of silver.

Thus, while in determining the atomic weights of elementary substances, the law relating to their capacity for heat is not, in any instance, inconsistent with the law relating to the isomorphism of their compounds, it appears that when these substances are examined in the state of vapour, they present phenomena which we are not yet in a position to account for completely. But if the single exception presented by mercury, in the state of vapour, is put on one side as inexplicable for the present, there appear to be many reasons for maintaining the correctness of the atomic weights assigned by Berzelius to chlorine, bromine, iodine, nitrogen, and hydrogen, as well as to phosphorus, arsenic, antimony, bismuth, and aluminum.

Prof. Rose concludes by expressing his opinion that the convenience which it is maintained by some chemists the atomic weights proposed by Gmelin present, is imaginary, and that, in any case, it appears highly desirable to recur to the atomic weights originally proposed by Berzelius, and thus to restore the harmony that formerly existed, since it is above all things important in science, to adopt those views which are supported by scientific grounds.

ON THE INFLUENCE WHICH LIQUOR POTASSÆ AND OTHER CAUSTIC ALKALIES EXERT UPON THE PREPARATIONS OF HENBANE, STRAMONIUM, AND BELLADONNA.

BY A. B. GARROD, M.D.,
Physician to University College Hospital.

Delivered before the Royal Medical and Chirurgical Society, Tuesday, November 24th, 1857, Sir Charles Locock, Bart., President, in the Chair.

The author first alluded to the frequent exhibition of henbane with liquor potassæ, and brought forward many proofs that such combinations were often administered. He also stated that the like mixtures were recommended by both medical and surgical authors. Dr. Garrod then proceeded to detail experiments which demonstrated beyond doubt that the active principle of henbane was destroyed by liquor potassæ and other caustic alkalies; and that such a combination was inert, both when topically applied (as evidenced by the absence of power in causing dilatation of the pupil of the eye), and also when internally administered. Similar observations were next detailed upon the preparations of stramonium and belladonna, and the results were found to be the same. It was, however, shown that the carbonates and bicarbonates of the alkalies were devoid of the property of destroying the activity of the plants. In some of Dr. Garrod's experiments as much as a drachm of the extract of henbane and an ounce and a half of the tincture were administered in combination with potash, without the production of the slightest symptom.

The results arrived at in the communication may be thus summed up:—

1st. Caustic alkalies, such as exist in liquor potassæ or liquor sodæ, entirely destroy the activity of henbane, preventing its action on the pupil when topically

applied, and its influence upon the system when internally administered; and, combined with a proper amount of these alkalies, the largest doses of the preparations of henbane may be given without the production of any symptoms.

2ndly. The same influence is exerted by the fixed caustic alkalies upon belladonna and stramonium.

3rdly. The carbonates and bicarbonates of potash and soda produce no injurious effects upon the preparations of any of the three above-named plants.

The deductions naturally to be drawn from these results are:—

a. That neither liquor potassæ nor any caustic fixed alkali should be prescribed with tincture or extract of henbane, as the virtues of the latter drug are thereby completely neutralized.

b. That when it is desirable to administer an alkaline remedy with henbane, either a carbonate or bicarbonate should be selected, which would probably be equally efficacious upon the stomach, if such influence be required, and certainly as efficient in altering the condition of the urine, and the mucous membrane of the urinary passages.

c. That the same precautions should be observed with regard to belladonna and stramonium, if at any time prescribed in conjunction with alkalies.

ON THE ORDINARY METHODS FOR DISCRIMINATING THE CINCHONA ALKALOIDS.

BY W. BIRD HERAPATH, M.D. LOND., F.R.S.E.

In consequence of the gradually increasing scarcity of the *cortex cinchonæ calysayæ* and its chief product quinine, many other barks have been introduced into commerce, which furnish alkaloids, having a strong general resemblance in the physical characters of those preparations of them more commonly employed in medicine, but differing widely in medicinal properties and commercial values.

In order to prevent fraudulent adulterations, it has long been highly desirable to have some ready methods of detecting admixtures of these alkaloids and their salts. The author having discovered several optical salts of these vegetable alkaloids, proposes to make their well-marked optical characters the means of such detection, and in a subsequent paper has fully developed his views upon this ready method of analysis, whilst in the present he has passed under review the various existing tests for the different cinchona alkaloids, and the results of his investigations may be enumerated under the following conclusions:—

The following different methods of detecting the various cinchona alkaloids have been proposed :—

To Bouchardat and Pasteur we are indebted for the use of polarized light as a means of discriminating these alkaloids by the rotatory power which they exercise upon its plane.

Liebig employs the difference of their solubility in ether for the same purpose.

Almost all the other tests proposed have for their object only the discovery of quinine.

Professor Stokes employs fluorescence, combined with the peculiar reaction, in respect to this phenomenon, of hydrochloric acid, alkaline chlorides, &c. Brandes, the green reaction produced by the successive addition of chlorine and ammonia, whilst Vogel has modified the latter test in several ways.

Pelletier has employed the agency of a stream of chlorine gas, and Marchand uses nascent oxygen, obtained from puce-coloured oxide of lead and sulphuric acid for the discovery of quinine.

Leers first proposed a combination of Liebig's ether test, with that of Brandes's chlorine and ammonia reaction, as a means of establishing the purity of cinchonidin (miscalled by him quinidin, in common with all German chemists).

De Vry has advised the employment of hydriodic acid or iodide of potassium, in order to discover the quinidin of Pasteur.

Van Heijningen depends on oxalate of ammonia to discriminate quinine from quinidin.

All these different tests the author has examined most critically, and, as far as it is possible to do so, determined the absolute numerical value of each method experimentally with the following results :—

He first explains MM. Bouchardat and Pasteur's researches on these remarkable alkaloids, from which it appeared that quinine and cinchonidin are powerfully lævogyrate, quinidin and cinchonine pre-eminently dextrogyrate, and that quinicine and cinchonicine are only slightly dextrogyrate upon plane-polarized light. These eminent experimenters determined also with accuracy the amount of these molecular rotations for each alkaloid. Yet the expensive nature of the apparatus, the complex formula requisite to reduce the observed amount of angular rotation to the normal molecular standard, and the many interfering actions necessary to be guarded against, effectually prevented this from ever becoming a process for general adoption, either among chemists or manufacturers.

Another method of recognizing the presence of quinine is founded on the optical phenomena of fluorescence, which have been investigated by Professor Stokes. Whilst endeavouring to turn this process to account in the quantitative estimation of quinine by means of excessive dilution, and marking the points at which the various phenomena of "epipolism," "fluorescence," and "internal dispersion" vanish, the author arrived at the following extraordinary results; premising that he employs the term "internal dispersion" to mean the positive, "fluorescence" the comparative, and "epipolism" the superlative degrees of the same optical power:—

I. Solutions containing 1 grain in 35,000 of either quinine or quinidin of Pasteur, exhibit epipolism and fluorescence; solutions with 1 grain in somewhat less than 140,000 grains of water are still fluorescent, with slight internal dispersion.

When diluted with from 3 to 10 gallons of water, these alkaloids continue to exhibit internal dispersion.

Solutions of quinicine are only slightly epipolic, and if the change has been perfect, scarcely at all fluorescent, but nevertheless strongly absorptive of rays of high refrangibility.

Cinchonidin also exhibits optical phenomena, but in a much slighter degree; about $\frac{1}{100}$th part of that of either quinine or quinidin.

Cinchonine is also fluorescent about $\frac{1}{120}$th part of the same alkaloids.

II. That on mixing fluorescent solutions of quinine, quinidin, or other cinchona alkaloid with the soluble chlorides, although all traces of optical phenomena are lost to the eye, yet the media still possess powerfully absorbent powers on the rays of high refrangibility, and, if sufficiently concentrated, are wholly opaque to them, without exhibiting any of the phenomena of dispersion, and greatly impede chemical action.

This was proved by three methods of observation:—

1st. By introducing vessels containing fluorescent solutions of quinine into other vessels filled with non-fluorescent solutions of the alkaloids, produced by previous admixture with chloride of ammonium, when all optical phenomena disappeared from the inner vessel.

2ndly. By surrounding fluorescent specimens of fluor-spar with these prepared solutions of the alkaloids, when the blue colour in the spar immediately disappeared.

3rdly. By photography; employing concentrated solutions of quinine mixed with chloride of ammonium in troughs to intercept the incident light from any object anterior to the camera, when it was found almost impossible to obtain any image upon the sensitive collodion plate, although the intensity of the visible image received on the ground-glass screen did not suffer any apparent diminution.

4thly. By photographic printing; troughs containing these solutions obstructed the chemical rays very considerably, thus interfering with the production of a positive picture from the negative, much longer exposure being necessary to produce any chemical effect.

III. That certain reagents do not destroy fluorescence; others only mask its appearance by their own colour; whilst some destroy it by neutralizing the excess of acid; others do so by producing salts which are themselves non-fluorescent media. Whilst a third class destroy it by really modifying the alkaloid itself.

IV. That as so many reagents of common occurrence interfere with the manifestation of fluorescence, and as it is also a property common to all the cinchona alkaloids herein described, its appearance becomes no longer of any value as a test for quinine.

V. Brandes's chlorine and ammonia test will discover 1 grain of either quinine or quinidin in 1 gallon of water, but shows no difference between these alkaloids, ex-

cept in very concentrated solutions, when there is a precipitate with quinidin, but not with quinine.

Quinicine is also influenced by this test, but less extensively.

VI. Dr. Vogel's first modification of this test is of no apparent value; but by also employing ammonia, the author has found that it will indicate both quinine and quinidin, detecting readily 1 grain of either in a pint, and showing slight evidence with 1 grain in 10,000 grains of water.

There is scarcely any reaction with quinicine.

VII. Dr. Vogel's other modifications of Brandes's test are unimportant, with the exception of the fourth, viz., excess of chlorine, and very little ammonia. This detects 1 grain in about 2000 grains of fluid very readily, if excess of acid be avoided at first. The test, however, is equally indicative of quinidin; it gives scarcely any perceptible reaction with quinicine.

VIII. Pelletier's chlorine gas-test succeeds very well with the free alkaloids, but does not show any indication with their salts. It is equally capable of detecting quinidin, and gives the same phenomena.

IX. Marchand's test is not a delicate reaction.

X. All the foregoing tests, although specially proposed for the discovery of quinine, possess equal powers and show the same appearances with quinidin. But they have no reaction on cinchonine, cinchonidin, or cinchonicine.

XI. Van Heijningen's test by oxalate of ammonia, produces, after some hours, a crystalline oxalate of quinine, when using a fluid containing only 1 grain of alkaloid in 800 grains of water, and very readily detects immediately 1 part in 350. It does not precipitate quinidin or cinchonidin, but it produces a white precipitate in concentrated solutions of cinchonine.

XII. De Vry's test for quinidin by hydriodic acid, or iodide of potassium in neutral solutions, produces a well-marked crystalline precipitate as a colourless salt, when 1 part of the alkaloid is present in 1000 of the fluid; the crystals, being short hemihedral prisms, are readily recognized; the neutral hydriodates of cinchonidin are colourless, silky, prismatic needles, and much more soluble. If to a solution of the sulphate of quinidin in dilute spirit ($\frac{1}{3}$) we add hydriodic acid, and expose to the action of light during some days, there is formed the red iodo-sulphate of the author.

The neutral hydriodate of quinine appears as lemon-yellow prisms. The neutral hydriodate of cinchonine appears as long, thick, colourless prisms, and is very soluble.

XIII. Liebig's ether test dissolves quinine, quinicine, and cinchonicine, and therefore does not discriminate between them, as they are all uncrystallizable. It dissolves also a portion of the quinidin and cinchonidin. Should the proportions of these alkaloids not exceed the solvent powers of the ether employed, they will not be indicated by this test. When crystallization occurs, the rhombic prisms indicate cinchonidin; the long slender aciculæ, quinidin; whilst an amorphous powder is demonstrative of cinchonine. Ether also extracts cinchonidin from cinchonine; but its sparing solubility in ether necessitates the employment of warmth, and a large quantity of ether.

XIV. Leers's combination of the ether test with that of Brandes can readily detect small portions of quinine, quinidin, or quinicine in cinchonine or cinchonidin, especially when used in the manner as modified by the author.—*Proceedings of the Royal Society.*

ON THE OPTICAL AND CHEMICAL CHARACTERS OF THE IODO-SULPHATES OF THE CINCHONA ALKALOIDS, TOGETHER WITH THE CHEMICAL ANALYSIS OF SOME OF THE SALTS.

BY W. BIRD HERAPATH, M.D. LOND., F.R.S.E.

In the former paper, the author examined the existing tests for discriminating between the various cinchona alkaloids, and pointed out their insufficiency. In the present paper he shows that the optical characteristics of the iodo-sulphates of the alkaloids quinine and quinidin are sufficiently well marked to render the existence of *either one* of these alkaloids *certain*, and that although the iodo-sulphate of cin-

chonidin is very closely related optically and chemically to the homologous salt of quinine, yet there are sufficient points of dissimilarity to enable us to diagnose between the two; and, moreover, that the production of this salt is a beautiful means of deciding readily whether cinchonidin is present in specimens of cinchonine or cinchonicine; all evidence of quinine or its allies having been decided in the negative by the results of the previous tests, as proposed by Brandes, Vogel, Pelletier, Leers, or the author.

The cinchonidin of Wittstein has also, by the same method, been proved by the author to be totally different from the cinchonidin of Pasteur.

Acetic acid and chloroform may also be employed for discriminating between cinchonine and cinchonidin.

The *chemical characters* of all these iodo-salts furnish no means of discrimination, for as a class they all agree in being more or less soluble in spirit, giving a deep sherry-brown solution, from which water precipitates them in an amorphous form, as dark brown, cinnamon-brown, or purplish-brown coloured precipitates; they are only very slightly soluble in dilute spirit, and scarcely at all in water, ether, turpentine, or chloroform: acetic, dilute sulphuric, or hydrochloric acid have but little action upon them, whilst concentrated hydrochloric or sulphuric acid decomposes them. Nitric acid rapidly acts upon them, even in the cold, with violent evolution of nitrous acid and production of heat, iodine being oftentimes liberated in the crystalline form.

Alkalies also decompose them.

Sulphuretted hydrogen, soluble sulphides, sulphurous acid and sulphites, together with chlorine water, instantly decolour their alcoholic solution, with the production of hydriodic acid.

In dilute alcoholic solutions, starch gives immediate evidence of iodine, and nitrate of silver gives a yellowish-white precipitate of iodide of silver, and some organic basic compound which can only be removed by the action of concentrated boiling nitric acid; this reaction, although commencing at the ordinary temperature, with violent disengagement of nitrous acid vapours, must be perfected by boiling.

Baryta salts exhibit the existence of sulphuric acid, which in all instances is an essential constituent in their formation.

The quinidin and cinchonine salts dissolve with more difficulty, in consequence of their greater thickness and less extent of surface.

Since the author had the honour of communicating his discovery of the optical salt of cinchonidin to the Royal Society, he has ascertained that its primary form is, like that of the quinine salt, that of a right rhombic prism, and usually very thin.

Both the quinine and cinchonidin salts are derivable from the primary rhombic prisms, and crystallize as rhomboids and β-prisms ..... { which obstruct plane-polarized light, when their longer diameters are parallel to the plane of the polarized ray.

and α-prisms ..... { which obstruct the same beam when their longer diameters are perpendicular to the plane of the polarized ray.

In the quinine salt ..... { the rhomb obtuse = 115°
" " acute = 65°

In the cinchonidin salt ..... { the rhomb obtuse = 137°
" " acute = 43°

A remarkable difference exists between the quinine and cinchonidin salt, which is, that the optical crystals of the last salt, if allowed to remain in the mother-solution with an excess of less than 1 per cent. of sulphuric acid, undergo a transformation, and become long, golden, silky aciculæ, radiating in beautiful globose tufts: this salt has some doubly absorbent powers also, but very feeble. When this salt is attempted to be redissolved in boiling spirit, in order to be recrystallized, it does not re-form, but the optical crystals are then produced; when the silky crystals are carefully air-dried, they retain their yellow colour, but if exposed over sulphuric acid at 62° Fahr., or if attempted to be dried at 212° Fahr., they lose 5.32 per cent. water = 6 atoms, and become a dark greenish-black residue, which is a tri-hydrate.

If this olive-coloured residue be boiled in dilute spirit, the optical crystals deposit on cooling.

The author's more recent analyses of the iodo-sulphates of the cinchona alkaloids have induced him to suggest the following formulæ for them:—

Sulphate of iodo-quinine	$C_{57} H_{33} N_2 O_5 \left\} \begin{matrix} \\ I_2 \end{matrix} \right\}$	$2 SO_3 HO + 5 HO = 840$
Sulphate of iodo-cinchonidin (optical salt.)	$\left\{ C_{57} H_{33} N_2 O_5 \right\} \begin{matrix} \\ I_3 \end{matrix} \left\}$	$2 SO_3 HO + 5 HO = 967$
Sulphate of iodo-cinchonidin (silky salt.)	$\left\{ C_{57} H_{33} N_2 O_5 \right\} \begin{matrix} \\ I_3 \end{matrix} \left\}$	$2 SO_3 HO + 9 HO = 1003$
Sulphate of iodo-quinidin	$C_{35} H_{19} N_2 O_4 \left\} \begin{matrix} \\ I_2 \end{matrix} \right\}$	$SO_3 HO + 5 HO = 637$
Sulphate of iodo-cinchonine.....	$C_{35} H_{19} N_2 O_2 \left\} \begin{matrix} \\ I_3 \end{matrix} \right\}$	$SO_3 HO + 6 HO = 757$

From this it appears that the optical salt of quinine differs in chemical atomic numbers merely in the possession of 1 atom less iodine, the cinchonidin salt having 3, the quinine salt 2 atoms iodine; but in each case 2 atoms of sulphuric acid, and 5 water, with an organic base of $C_{57} H_{33} N_2 O_5$ common to both. How this is derived from $C_{40} H_{24} N_2 O_4$ in the one case, or $C_{40} H_{24} N_2 O_2$ in the other, it is difficult to point out in the present state of the question.

Closely as the quinine and cinchonidin salts agree amongst themselves, they differ widely from the quinidin and cinchonine compounds.

The quinidin salt, after recrystallization, presents itself as long quadrilateral acicular prisms, having a deep ruby or garnet-red colour, with a bluish-violet or light purplish reflexion-tint; it is sometimes deposited in thin flat plates, or long, flat, acicular prisms; these, when thin, transmit a pure yellow colour, but in thicker plates it becomes reddish, with a tinge of brown.

There is scarcely any appearance of double absorption in this salt; the thicker crystals alone exhibit it, when their usual tint becomes darkened on analysis with a Nichol.

This salt requires 31 parts of boiling spirit, and 121 parts at 62° to dissolve 1; water precipitates it as a cinnamon-brown powder.

Its deep marone-coloured large aciculæ had a specific gravity of 1.7647 at 62°.

These large crystals, exposed whole to a temperature of 212°, decrepitate afterwards on exposure to the air; but dried at 212°, they do not appear to lose further water after prolonged exposure to the drying-bath.

The cinchonine salt exists in long, acicular, quadrilateral prisms, of a deep purplish-black colour, like that of elderberries.

Thin crystals transmit a yellow tint—pure gamboge-yellow when very thin; soon passing through a deep sherry-brown to a blood-red colour, then a deep port-wine colour, and then becoming opaque.

These crystals reflect a deep steel-blue colour when analyzed with a Nichol's prism, and generally across the short diameter of the prism, which is the analogue of the *a*-prism of the quinine salt. The cinchonine salt possesses doubly absorbent powers, much more powerfully so than the quinidin salt, but inferior to all the others; the body colour is deep sienna or bistre-brown.

These investigations appear to show that the alkaloids in each instance undergo some modification, but not analogous to substitution; it appears more like a splitting-up into different molecular groups, and a re-arrangement of these amongst themselves, as the formulæ of the organic bases differ much from those of the original alkaloids.

All these iodo-salts possess double refractive properties.

When the acid sulphates of the mixed alkaloids, quinine, quinidin, cinchonine, and cinchonidin, are dissolved in dilute spirit, and the temperature increased to 80° or 120°, treatment with tincture of iodine readily separates the quinine salt first.

Subsequent further treatment in the same manner produces the cinchonidin salt, more or less mixed with the quinine salt.

On still further treatment, the quinidin salt is formed with its well-marked characters.

The cinchonine salt is by far the most soluble in spirit; and when a large quantity of cinchonine exists, this compound will also appear along with the quinidin salt.

This test is a beautiful and ready method of proving the presence of cinchonidin in cinchonine, which would otherwise be considered pure, Brandes's test having shown

the absence of quinine and quinidin. In the same way, this test is an easy method of detecting mixtures of quinine and quinidin, the optical characters of the two salts being so well marked, that no difficulties can exist in their discrimination.

It does not offer such facilities for the separation of quinine from cinchonidin; the two salts go down together, especially if large quantities of cinchonidin exist with mere traces of quinine.

For the success of this test, a small portion only is necessary: with quinine and quinidin $\frac{1}{200}$th part of a grain has furnished evidence of the two alkaloids; one grain would be abundant to detect all the alkaloids.

The foregoing method of examination has enabled the author to prove that the substance which Rosengarten, of Philadelphia, called quinidin, was really the cinchonidin of Pasteur, and the details of his cures of fever, therefore, by quinidin, are rather to be ascribed to cinchonidin.

The cinchonidin of Wittstein, of Munich, is a totally different alkaloid, giving, with sulphuric acid and iodine, a salt at once to be distinguished by the eye from either of the two iodo-sulphates described, but yet possessing optically doubly absorbent powers. This salt has a deep orange-yellow colour by transmitted light, merging into sienna-brown in thicker plates, which are generally flat and much imbricated in the method of crystallization, and also derived from a rhombic prism. The reflected tints are brownish-olive, not unlike dead leaves, or brown beech-leaves. These crystals are more doubly absorbent than either the quinidin or cinchonine salt, but less powerfully optical as tourmalines than the quinine or cinchonidin compounds. When polarized, they transmit a sienna-brown body-colour if moderately thick, and thicker plates are bistre-brown, but when sufficiently thick, they are wholly impervious to plane-polarized light. The substance was not in sufficient quantity to admit of any analysis.

All the alkaloids were furnished in a most obliging manner by Mr. John Elliott Howard, to whom the author is deeply indebted for them, and thus publicly desires to express his acknowledgments; many of these various alkaloids having taken more than ordinary trouble in the preparation and purification.

It is well known that quinine and quinidin, under the continued effect of heat and dilute sulphuric acid, undergo a molecular change into quinicine, which M. Pasteur has asserted to be isomeric with the original alkaloids, but hitherto no complete analysis has been made of the metamorphosed alkaloids.

The author has produced an iodo-sulphate of quinicine, but it is no longer a crystalline compound; it presents itself as a deep blood-coloured resin, very soluble in spirit and readily precipitated by water from its spirituous solution. This substance has not yet been submitted to analysis. During the production of the iodo-sulphate of quinidin a certain portion of the alkaloid becomes converted into quinicine, as may be demonstrated by the production of this resinous compound from the mother-liquid on the addition of further proportions of iodine.

Cinchonine and cinchonidin become converted into cinchonicine by similar treatment, and this amorphous uncrystalline alkaloid also forms a resinous iodo-sulphate; its colour is deep purple-black, and it deposits itself on spontaneous evaporation of the spirit, or on the cooling of a highly concentrated spirituous solution, in small drops, highly tenacious at 100° Fahr., but becoming solid at 60° Fahr. This compound has, in a fine state of division, a beautiful purplish-blue colour, and such a film generally forms around the edge of the vessel in which it is produced.

Cinchonicine appears to be one of the products during the manufacture of the iodo-sulphate of cinchonidin, but there is a much larger production of it during the formation of the cinchonine salt.—*Proceedings of the Royal Society.*

OBSERVATIONS ON THE POISON OF THE UPAS ANTIAR.

BY PROFESSOR ALBERT KÖLLIKER.

During my stay in England, in the autumn of 1857, I was so fortunate as to acquire the rare poison of the famous *Antiaris toxicaria* (Lesch.), with which no experiments have been tried since the time of Magendie, Brodie, Horsfield, and Schnell and Emmert (1809–1815). I owe my specimens of the Antiar poison to my friend Prof. Christison, of Edinburgh, who had it from Borneo, and to Dr. Horsfield, of London, who collected it himself during his stay at Java in the beginning of this

century; and as both specimens were fully active—as some preliminary experiments made in company with my friends, Dr. Sharpey and Dr. Allen Thomson showed—I thought it well worth while to devote some time to the study of the poison, and to try to elucidate its manner of action on the animal organism. The following are the principal results which I obtained in my experiments with frogs, and I hope that they will not be deemed unworthy of notice by those who take an interest in the physiological action of poisons in general:—

The Antiar, like most other poisons, acts from the intestinal canal, and from wounds; but it must be remarked, that it is much more energetic and rapid when introduced into a wound. The symptoms which are observed in frogs, in the latter case, are the following:—First of all, the *voluntary movements* become less energetic, and at length cease totally, 30 to 40 minutes after the introduction of the poison (after 21^m min. and $1^h\ 21^m$ max.). Then follows a time in which reflex movements may be caused by stimulating the skin; but this faculty also is lost very soon, viz., at from 50 to 60 minutes (at 33^m min. and 85^m max.); and the animals die without the slightest trace of convulsions or tetanic spasm. If now the frogs are opened, we find that, without any exception, *the heart has ceased to beat.* The auricles are dilated, the ventricle corrugated, rather small, and generally red, as if blood had been extravasated into its muscular parietes; but very soon the exposure of the heart to the air causes the ventricle to shrink a little more, and to become pale and stiff, as if in the state of *rigor mortis.* All interior organs, especially the lungs, liver, stomach, intestine, and kidneys, are gorged with blood, and in a state of great, especially venous, hyperæmia. The blood is fluid and rather dark, but soon coagulates when exposed to the air, and assumes a brighter colour. The lymphatic hearts cease to beat as soon as the reflex movements are lost. At the same time the nerves are yet found excitable, but their power is very low, and generally vanishes in the second hour after the application of the poison. The same must be said of the muscles, which contract very feebly when directly stimulated by galvanism, and in most cases lose their power totally in the second or third hour, and generally a little after their nerves. The *rigor mortis* begins early, sometimes in the sixth hour, and is generally well established at the eighteenth hour.

Amongst all these symptoms, to which we may add some signs of vomiting occurring now and then, there was none which attracted my attention more than the cessation of the movements of the heart, considering the great energy which this organ possesses in frogs; and I tried, therefore, before all, to elucidate the action of the Antiar upon the heart. For this purpose I instituted a new series of experiments, in which I exposed the heart by the section of the sternum, before the poison was introduced into a wound of the back; and in this way I easily got the result, that the heart ceases to beat as soon *as from the fifth to the tenth minute* after the introduction of the Antiar; and so, that first the ventricle stops, and half a minute or one minute later, also the auricles. Now, as the frogs at this time are not at all deprived of their faculty to move, we may have the rather astonishing view of an animal, with artificially-paralysed heart, which moves and leaps as freely as if nothing had happened.

The experiments just mentioned prove, *that the first action of the* Upas Antiar *is to paralyse the heart;* and I am therefore quite in accordance with Sir Benjamin Brodie, who, by his experiments on mammalia, came to the same result in 1812; whilst I cannot otherwise than disagree with Schnell (Diss. de *Upas Antiar*, Tubingæ, 1815), who assumes that this poison acts in the first place on the spinal marrow. Now this point fixed, the further question arises, whether the other symptoms mentioned, viz., the paralysis of the voluntary and reflex movements, and the loss of the irritability of the muscles and nerves, are only the results of the paralysis of the heart, or must be attributed to a specific action of the Antiar. For the elucidation of this question, I found it necessary to study the consequences of the suppression of the heart's action on the organism of frogs, which I did in the same way as it had been done by others, especially by Kunde (Müller's Archiv, 1847), viz., by cutting out the heart, or by putting a ligature around the base of it, so as to stop the circulation totally. The results of these experiments were in both cases the same, that is to say, the voluntary movements ceased in from 30 to 60 minutes, and the reflex movements after one or two hours. Hence it follows that these two symptoms of the poisoning with Antiar are simply dependent on the paralysis of the heart caused by it. With reference to the irritability of the muscles and nerves, on the contrary, it is easy to

show that the ligature or excision of the heart has not the same influence as the Antiar, inasmuch, as in the first case the muscles and nerves are found irritable six or seven hours, and more, after the experiment has been made. Therefore it may be said that the Antiar has a direct action on these organs.

These points once demonstrated, there remained one more question to elucidate, namely, whether the Antiar acts only upon the muscles, or also upon the nerves. If we consider that the Antiar undoubtedly paralyses the muscles, we may easily see that the loss of the excitability of the nerves possibly depends merely upon the impairment of the muscular contractility, and is therefore not real, but only apparent. With a view to determine the real state of things, I tried a third series of experiments—poisoning frogs in such a manner that the muscles of one limb were kept free from the influence of the poison. This was done in two ways: first, by putting a ligature round the crural artery and vein of one leg; and secondly, by cutting through a leg entirely, after the ligature of its vessels, with the exception only of the ischiadic nerve. In poisoning frogs treated in one of these ways, through a wound of the back, I found that, with the exception of the heart, the Antiar acts in the first instance upon the muscles. This is shown by the fact, that in the second hour, at the time when the muscles of the poisoned parts have lost their irritability, the nerves of the sacral plexus in the abdomen still possess their full influence upon the muscles of the leg which has been kept free from the action of the poison. One might be inclined from this to conclude, that the nerves are not at all acted upon by the Antiar; but this inference would be erroneous. In fact, the experiments just mentioned, if followed a little longer, show that in the third or fourth hour the sacral plexus also becomes inactive, at a time when the muscles of the non-poisoned leg are fully contractile. The Antiar, therefore, paralyses also the nervous trunks, but later than the muscles.

From all these experiments, it seems to follow that the Antiar is a poison which acts principally upon the muscular system (the heart and the voluntary muscles), a conclusion, in favour of which I may further add, that the muscles and the heart of frogs poisoned by Urari (Woorara Curare) lose their irritability totally, and in a short time, if Antiar is introduced into a wound some time after the Urari. If we consider that, as I have shown (see *Proceedings of the Royal Society*, 1856, p. 201), the Urari only acts upon the terminations of the nerves in the muscles, and does not affect the irritability of the heart and muscles at all, we may conclude, that a poison, which, as the Antiar, is capable of paralyzing the muscles after the Urari, has really a direct action upon the muscular fibre.

The results of my investigation into the effects of the Antiar upon frogs, are therefore the following:—

1. The Antiar is a paralyzing poison.
2. It acts in the first instance and with great rapidity (in 5 to 10 minutes) upon the heart, and stops its action.
3. The consequences of this paralysis of the heart are the cessation of the voluntary and reflex movements in the first and second hour after the introduction of the poison.
4. The Antiar paralyzes in the second place the voluntary muscles.
5. In the third place it causes the loss of excitability of the great nervous trunks.
6. The heart and muscles of frogs poisoned with Urari may be paralyzed by Antiar.
7. From all this it may be deduced, that the Antiar principally acts upon the muscular fibre and causes paralysis of it.

So much for this time. My experiments with the Antiar upon warm-blooded animals have only begun, and I am not yet able to draw any conclusion from them. As soon as this will be possible I shall take the liberty to submit them to the Royal Society, together with the results of my experiments with the *Upas teinté*, which poison I had also the good fortune to obtain through the kindness of Sir Benjamin Brodie and Dr. Horsfield. With regard to the Antiar I may further add, that experiments made independently, and at the same time, by my friend Dr. Sharpey with this poison, have conducted to the same results as my own.—*Proceedings of the Royal Society.*

THE PRODUCTION OF LEECHES IN MICHIGAN.

BY FREDERICK STEARNS.

The great cost of imported leeches, and their liability to accident and disease, have proved a serious drawback to their general use in this country, more especially in interior towns and cities, where the delay incident to transportation is another objection to the purchase and sale of them by the Pharmaceutist.

I believe that large dealers in leeches in the country confine themselves solely to the importation of those of foreign collection, and that our indigenous varieties, some of them valuable, are entirely neglected.

I desire to call the attention of the Association to the fact—one proved by an experience of twenty years—that, by means and appliances so simple as to commend them to Pharmaceutists in every part of our Union, we may ensure to ourselves an abundant and cheap supply of these invaluable animals.

The foreign varieties of leeches can be easily naturalized, and the supplies of those *indigenous varieties* found valuable can be indefinitely increased.

The idea of growing leeches in the State of Michigan was first carried out by a member of the medical profession who moved there from New York city some twenty years ago, while that portion of his adopted State was yet a wilderness. Feeling the want of leeches, which he had freely used in his eastern practice, he was led to experiment with those found in the neighbouring marshes, with indifferent results. He finally procured in New York a lot of Spanish leeches, and, building a tank for them, had the satisfaction of seeing them thrive admirably, and to this time has produced them in larger quantities, sufficient to supply the practitioners of his portion of the State. The *Hirudo decora*, a leech found abundantly in some parts of Pennsylvania, was in this way introduced, and is now largely used in some counties of the State.

The aquarium required consists of a wooden tank, eight feet long, six feet wide, and four feet deep. This is set into the ground near a running stream of water, a portion of which is conducted into and through the tank, its entrance and exit being made through wire cloth to prevent the escape of leeches. The bottom of the tank to the depth of eighteen inches is covered with cobble stones, in order to afford a refuge for the leeches. The water exit is placed about ten inches below the top edge of the tank, which edge has a rim of boards projecting inwards, all the way around nailed to it. This is all the apparatus required, and they need but very little attention. A few frogs thrown in once a week will supply five thousand of them with food sufficient. In winter they become torpid, and the tank is allowed to freeze over and so remain till spring.

They produce their eggs during the months of June and July, and the leech is matured in about two years. Their age when subject to ordinary care is about fifteen years.

When applied they bite readily, and draw about two drachms of blood, the flow of which, however, is to be excited in the usual ways.

Those parts to which leeches are to be applied should be well cleansed from smell or perspiration, and they are best used by putting the requisite number into a suitable sized cupping-glass partly filled with water, and applying the edges of the cup closely to the part to be leeched: after they have taken hold, the cup may then be gently removed.

The naturalized leech is hardy, rather small (from one to two and a half inches long), and very active. Those produced from the variety brought from Pennsylvania are of a velvety olive-green colour upon the dorsal surface, with three longitudinal rows of spots—the centre one orange-coloured, the others black: the belly is of a rusty orange spotted with black.

The grey leech of Michigan, the best of those indigenous to the State, is of a uniform grey colour, extremely thin or flat, peculiar in its motions, is with difficulty induced to draw, though its bite is unaccompanied with any pain. The eggs of the leech, instead of being left to take care of themselves, as in the case of the other leeches, are attached to the belly, as are the young leeches for some time after their development.

The low price at which these leeches can be produced renders their aid available

to the poorest; and while, by cheapening them, they are, by increased demand, rendered a greater source of pecuniary profit, they will cost the producer nothing but a little time and patience.—*From the Proceedings of the American Pharmaceutical Association*, 1857.

ON THE NATURE OF FLAME, AND ON THE CONDITION OF THE SUN'S SURFACE.

BY JOHN W. DRAPER, M.D.,

Professor of Chemistry and Physiology in the University of New York.

Among the recent publications on photo-chemistry, there is one by Professor Dove on the electric light (*Phil. Mag.*, Nov., 1857), which will doubtless attract the attention of those interested in that branch of science. Examination by the prism, and by absorbing and reflecting coloured bodies, leads him to the conclusion that it is necessary to consider the luminous appearance as having two distinct sources :— 1st. The ignition or incandescence of the material particles bodily passing in the course of the discharge ; 2nd. The proper electrical light itself. As respects the first, he illustrates its method of increase from low to high temperatures, by supposing a screen to be withdrawn from the red end of the spectrum through the coloured spaces successively towards the violet; and that of the latter from the bluish brush to the bright Leyden sparks, by a like screen drawn from the violet towards the red.

The true electric light exhibits properties resembling those observed in actual combustions, as though there was an oxidation of a portion of the translated matter when the spark is taken in air. The order of evolution of rays in this instance happens to be the same as in the second illustration of Professor Dove—that is, from the violet to the red. There are certain facts connected with these appearances of colour which are not generally known, and deserve to be pointed out.

In the *Philosophical Magazine* (Feb., 1848), I showed experimentally that there is a relation between the colour of a flame and the energy with which the combustion giving rise to it is going on. The more vigorous and complete the combustion, the higher the refrangibility of the light. A flame burning in its most tardy and restricted way, emits rays that are red ; but burning in its most complete and effective manner, rays that are violet. In intermediate states of combustion, the intermediate colours are evolved in their proper order of refrangibility.

The flame of a candle or lamp consists of a series of concentric luminous shells, surrounding a central dark core. These shells shine with different colours, the innermost one immediately in contact with the dark core being red, and having a temperature of 977° F. Upon this, in their proper order of refrangibility, are shells, the light of which is orange, yellow, green, blue, indigo, violet. When we look upon such a flame, the rays issuing from all the coloured strata are received by the eye at once, and impress us with the sensation of white light.

The differently coloured shells of which a flame thus consists, may be easily parted out from one another, and demonstrated by a prism. Their cause is the slower rate at which combustion occurs at points more and more towards the interior. On the outside, which we may say is in contact with the air, the combustion is most vigorous and complete, and hence the light there emitted is violet ; but in the most interior portion of the shining shell, resting upon the dark combustible matter, the atmospheric air can hardly penetrate, or rather its oxygen is exhausted and consumed. Between the exterior and interior surface, the burning is going on with an activity constantly declining, because the interpenetration or supply of oxygen is gradually less and less.

But besides this collection of coloured shells, constituting what may be termed the actual flame, there is another region exterior thereto, and to be distinguished both in its chemical nature and in its optical relations. Chemically, it consists of the products of combustion and of the unburnt residues of the air—that is to say, carbonic acid, steam, and nitrogen. These are all the time escaping out of the true flame and envelop it as an exterior cone or cloak. Optically, this portion differs from the true flame in the circumstance, that it is shining as an incandescent, ignited, but not a burning body. For physiological reasons, into the detail of which it is not necessary here to go, the tint of this exterior cloak seems to be a

monochromatic yellow. That, however, is to a considerable degree a deception; prismatic examination proving that all the other colours are present, and that the yellow merely exceeds the rest in force or intensity.

A flame thus far may be considered as offering three regions:—1st. A central nucleus, which is not luminous, and consists of combustible vapour; 2nd. An intermediate portion, the true flame, arising from the reaction of the air and the combustible vapour, and being composed of a succession of superposed shells, the interior being red, the exterior violet, and the intervening ones coloured in the proper order of refrangibility; the cause of this difference of colour being the declining activity with which the combustion goes on deeper and deeper in the flame. As to temperature, the inner red shell cannot be less than 977° F., and the exterior violet one probably more than 2500° F. 3rd. An envelope consisting of the products of combustion, exterior to the true flame, shining simply as an incandescent body, and its light for the most part overpowered by the brighter portion within.

By the aid of the facts thus presented, we can easily explain the nature of the other regional divisions distinguishable in such a flame. There must be a blue portion below; blue, because it consists of the most refrangible rays, which issue forth in abundance, for there the exterior air is most copiously and perfectly applied. At the upper end of the flame, particularly if the wick be long, and the supply of combustible matter abundant, the light emitted is red, for the products of combustion ascending past that part, make it difficult for the exterior air to get access.

Upon these principles we may also predict what colour a flame will have when we vary the circumstances of its burning. Tallow or wax at temperatures greatly beneath their usually understood point of combustion, oxidize with a pale violet phosphorescent light, quite perceptible nevertheless in a dark room; and here the light is violet, for the supply of combustible matter is small, and that of the air abundant. The oxidation is therefore thorough and prompt. For a like reason, sulphur, as we commonly see, burns blue; but if a piece thereof is thrown into nitrate of potash ignited in a crucible, the light yielded is of intolerable brilliancy, and absolutely white. Its whiteness does not depend upon the physiological fact, that any colour, if it be intensely brilliant, will seem white to the eye; but it is optically white, as is proved by prismatic examination, when all the colours are perceptible. And the reason of this is, that at the high temperature to which the sulphur is exposed, it volatilizes faster than the nitrate of potash and air together can oxidize it, and offers every intermediate rate of combustion, and emits rays of every refrangibility.

In like manner it may be shown that carbonic oxide must burn with a blue flame, and cyanogen with a red. We can also foresee what must be the optical result of resorting to unusual methods of combustion, as when we throw into the interior of a flame a jet of air from a blowpipe. In this case we destroy the red and orange strata, replacing them by bluer colours. Examining such a blowpipe cone by the prism, we have a beautiful demonstration that such has actually taken place.

There is one of these special cases which deserve attentive consideration in connexion with the appearance of the electric light: it is the production of Fraunhoferian lines when things have been arranged in such a way that an incombustible material is present in the substance to be burnt. This state is perfectly represented in the case of cyanogen, which contains more than half its weight of incombustible nitrogen. When the peach-coloured nucleus of the cyanogen flame is properly examined, it yields a series of dark lines and spaces exceeding in number and strength those of the sunlight itself. These fixed lines are the representatives of dark shells, superposed among the shining ones with definite periodicity. In such a cyanogen flame they bear no relation to the burning of the carbon, but to the disengagement of the nitrogen they must be attributed.

In other cases dark lines are replaced by bright ones, as in the well-known instance of the electric spark between metallic surfaces. The occurrence of lines, whether bright or dark, is hence connected with the chemical nature of the substance producing the flame. For this reason they merit a much more critical examination than has been yet given to them, for by their aid we may be able to ascertain points of great interest in other departments of science. Thus if we are ever able to acquire certain knowledge respecting the physical state of the sun and other stars it will be by an examination of the light they emit. Even at present, by the aid of the few facts before us, we can see our way pretty clearly to certain

conclusions respecting the sun. For since substances which are incandescent, or in the ignited state, through the accumulation of heat in them, show no fixed lines, their prismatic spectrum being uninterrupted from end to end, it would appear to follow that the luminous condition of our sun, whose light contains fixed lines, cannot be referred to such incandescence or ignition. At various times those who have studied this subject have offered different hypotheses : one regarding the sun as a solid or perhaps liquid mass in a condition of ignition ; another considering the light to be electrical ; a third supposing him to be the seat of a fierce combustion. Of such hypotheses we have given reason for declining the first. Prismatic analysis, which demonstrates no resemblance between the light of the sun and that of any form of electric discharges with which we are familiar, enables us in like manner to reject the second ; and upon the whole, facts seem most strongly to prepossess us in favour of the third, in artificial combustions similar fixed lines being observed. If such is to be regarded as the physical condition of the sun, we can no longer contemplate him as an immense mass slowly and tranquilly cooling in the lapse of countless centuries by radiation into space, as so many considerations drawn from other branches of science have hitherto led us to suppose, but he must be regarded as the seat of chemical changes going on upon a prodigious scale, and with inconceivable energy.

If the law designated above, that the more energetical the chemical action in combustion, the more refrangible the emitted light, be translated into the conceptions of the undulatory theory, it not only puts us in possession of a distinct idea of the manner in which the combustive union of bodies is accomplished, the quickness of vibration increasing with the chemical energy, but it also enables us to transfer for the use of chemistry some of the most interesting numerical determinations of optics.—*Philosophical Magazine.*

University, New York, Dec. 10, 1857.

ON THE MOLECULAR PROPERTIES OF ANTIMONY.

BY G. GORE, ESQ.

Antimony may be readily deposited by the electro-process from either of the following liquids:—5 parts of tartar-emetic and 5 parts of tartaric acid dissolved in a mixture of 2 parts of hydrochloric acid and 30 parts of water; or 3 or 4 parts of tartar-emetic dissolved in 1 part of the ordinary chloride of antimony.

The metallic deposits obtained from these two liquids differ greatly in appearance, in structure, and in physical properties: that obtained from the first liquid has a silver-grey colour and frosted surface, is hard in texture, and has a beautiful radiating crystalline structure; whilst that obtained from the second liquid has the colour and appearance of highly polished steel, and has a bright metallic amorphous fracture. The specific gravity of the former is 6.55, whilst that of the latter is 5.78, both being somewhat variable in this respect. The electro-chemical equivalent of the crystalline variety, after deducting a small portion of gas contained in it, is about 40.2; and of the amorphous kind, after deducting a much larger per-centage of gas and of chloride of antimony, which it always contains, the same; but the equivalents actually obtained, including those substances, were 40.7 for the crystalline and 43.3 for the amorphous variety. Amorphous antimony was found to be electro-positive to the crystalline kind, both in acids and alkalies ; it was also thermo-electro-positive to that substance; and both reduced silver by immersion in a solution of nitrate of silver.

Both these substances when deposited are in unequal states of cohesive tension at their two surfaces, frequently in so great a degree as to rent the metal in all directions. But the most remarkable circumstance, and of which a brief account was published in the *Philosophical Magazine*, January, 1855, is, that amorphous antimony is liable, by percussion or heat, to undergo a rapid and intense molecular change throughout its mass, consisting apparently of a violent commotion amongst its particles, similar, but in a much higher degree, to the changes already observed by other experimentalists in sulphur, selenium, iodide of mercury, &c., and attended by evolution of an extraordinary amount of heat, sufficient, when the substance is

massive, to raise its temperature from 60° to upwards of 450° Fahr., melting in several instances bars of tin and other metals.

During the action the chloride of antimony and a portion of the gas are expelled by the heat, and the substance loses its remarkable property. After the action the antimony is found to have undergone no oxidation, but to have considerably altered in its physical characters; it has lost its steel-bright colour and become comparatively grey, and has acquired a dull grey granular fracture; its specific gravity has also increased, and it has evidently passed a considerable stage towards the condition of the other variety. The grey metal undergoes no such change.

By careful trituration of thin pieces of the amorphous metal under cold water, it has been obtained in the state of a fine powder possessing the same molecular property. The chloride of antimony adheres to the metal with considerable force, and is only partly removed by digesting the powder in dilute hydrochloric acid for a week; and the gas contained in both varieties is only expelled by pressing them.—*Proceedings of the Royal Society.*

ON THE BRINE-SPRINGS OF CHESHIRE.

BY AUGUSTUS BEAUCHAMP NORTHCOTE, F.C.S.,*
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The existence of salt deposits in Cheshire, and of the brine-springs which flow from them, has from the earliest historic periods exercised a very peculiar influence upon the economic features of that county. It appears from the record of Domesday, that salt was even then one of the principal articles of its commerce, and that at a period anterior to the Norman Conquest it brought in a considerable revenue to the Crown; for as early as the time of Edward the Confessor, the Wiches, as they were called, are stated to have been very productive, and the tolls levied upon the amount of salt sold were divided in the proportion of two-thirds to the king and one-third to the Earl of Chester. Upon the Conqueror's accession, the earldom was given to Hugh Lupus, his nephew; but the property attached to it had diminished in value; for it is recorded that the salt-works at Middlewich and Nantwich, which under the Saxon rule had produced a rental of £16 per annum, had fallen into complete disuse; and that those of Nantwich, from which an annual income of £20 had been derived, were almost as much neglected, for out of eight salt-works which had formerly flourished at this latter place, one only was at that time in operation. This period of depression was not, however, of long duration, for shortly afterwards a partial recovery had taken place, since the Nantwich salt-works are spoken of as being let to farm by the Crown for £10, the Middlewich at 25*s.*, and the Northwich at 35*s.* per annum.† It is thought probable that at this period the chief export of Cheshire salt was to Wales, for the Welsh gave to Nantwich the name of Hellath Wen, or the white salt-pit; much export trade could not have been carried on, for very long after this date, the salt manufacture of Cheshire did not exceed the consumption of the county itself, and a few of its immediately adjoining neighbours.‡

It is curious to observe how the importance of places decreases in course of time through the effect of influences, at first apparently but slightly adverse, becoming under somewhat altered circumstances highly detrimental. Nantwich throughout the whole of its early history held the first rank among the salt-producing towns;—there were situated the brine-pits which Henry III. stopped up in order to distress the Welsh by cutting off their supply of that necessary article of food; and when this embargo upon the commercial activity of the town was withdrawn, we find it far surpassing its former self in the energy of its undertakings. This increasing prosperity and wealth continued until it reached a culminating point, from which it has ever since gradually but irretrievably descended. It seems to have attained its summit in the time of Henry VIII., for Leland states that at that time Nantwich contained 300 salt-works: their reduction then began, and in the early part of the reign of Queen Elizabeth their number had decreased to 216, whilst in 1624 they had dwindled nearly to 150. The cause of this declension was want of water-carriage.

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* Communicated by the Author.

† Lyson's *Magna Britannia*, vol. ii, part ii., p. 408 (1810).

‡ *Ibid.*, pp. 408, 409.

Nantwich being unfortunately situated beyond that point of the Weaver up to which it was navigable; a more advantageous locality was therefore sought for; the banks of the river were examined, and other springs found in more favoured situations, possessing moreover, in addition to superiority of position, the no less important advantage of greater concentration. From the date of that discovery the salt manufacture in Nantwich steadily declined, although the inhabitants still repaired annually on Ascension day to the "Old Biat," their most ancient salt-pit, and adorning it with flowers, ribands, and green boughs, they danced round it to their rustic music, and sung a hymn of thanksgiving for the blessing of the brine. This old custom was discontinued about the middle of the last century, for the blessing which they celebrated was fast leaving them. In 1810* one salt-work only existed in the town, and that is now, I am told, done entirely away with and the pit closed. But while Nantwich has been thus descending in the scale, Middlewich and Northwich have been increasing in importance; and along the lines of water communication, the rivers Weaver and the Grand Trunk Canal, which runs parallel with the river Wheelock, other places have sprung up from time to time. Of these the most important appear to be,—Winsford on the Weaver considerably below Nantwich, Marston and Winnington on the same stream in the immediate neighbourhood of Northwich, and Anderton somewhat nearer the river's mouth; whilst on the Wheelock, in the vicinity of Sandbach, several works of great consequence have been established. A few statistics will show the immense increase which this branch of manufacture has undergone within a comparatively short period. Within the ten years from 1800 to 1810 the amount of salt produced in Northwich is said to have doubled, and the annual average of white or manufactured salt sent down the Weaver from Winsford and Northwich during that period was 139,317 tons;† this appears to have been the entire amount shipped on the Weaver, and is therefore comparable with the total quantity of white salt‡ (as distinguished from rock-salt) which was carried down that river in the year 1832, which amounted to 383,669 tons, and which by the year ending April 5, 1856, had increased to 709,514 tons. With this, other accounts agree; for Lyson states that in 1805-1806 the total annual produce of the Cheshire brine-pits, those of Nantwich and Frodsham excepted, was 16,590 tons; whilst at the present time, single manufacturers, such as Mr. Blackwell of Wheelock, and Messrs. Kay of Winsford, produce respectively 70,000 tons, and from 50,000 to 60,000 tons of salt per annum.

The salt which is now produced in Cheshire is made, I understand, exclusively from natural brine-springs; but it has formerly at various times been obtained by dissolving rock-salt in water and evaporating the clear solution. The principal varieties manufactured are three: the salt of coarsest grain, or bay-salt; that of the finest grain, to which the name of table-salt is applied; and an intermediate variety, which is called common salt. The latter is made in the largest quantity, and forms the principal part of the vast export of Cheshire. More than three-fourths of the total amount of salt produced is used for foreign consumption; and of the remaining fourth, a considerable portion is employed in the supply of the British fisheries. It has, however, only attained its reputation after a somewhat severe struggle with foreign competitors; for in the year 1810, Mr. Henry§ found it necessary to set forth an apology for British salt as an agent in curing provisions in no way inferior to that prepared from sea-water by evaporation on the shores of the Mediterranean, and to deprecate the folly of Great Britain in expending large sums of money in the purchase of an article, which she possessed the means, beyond almost any other country in Europe, of drawing from her own internal resources. Fortunately these remonstrances were not addressed in vain, and this country soon ceased to neglect her native produce, and to import that from abroad which she had in such abundance and of such excellent quality at home.

The great means, however, of extending the salt trade in this country, has been the gradual improvement in the mode of raising and evaporating the brine. Originally, in the early days of the manufacture, the method of obtaining salt from the brine by evaporation was unknown; and its preparation consisted only in pouring

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* Lyson's *Magna Britannia*, vol. ii., part ii., p. 703. † *Ibid.*
‡ Ure's *Dictionary of Arts and Manufactures*, 3rd edit., p. 1091.
§ *Phil. Trans. Royal Soc.*, 1810, p. 89.

the brine upon burning branches of oak and hazel, from the ashes of which the deposited salt was afterwards collected. At length, however, the plan of evaporation was devised; but for a long time wood was the only fuel, of which such immense quantities were consumed at the salt-works in Droitwich in the time of Camden, that he represents Feckenham Forest and the neighbouring woods as becoming perceptibly thinner and thinner day by day. This havoc seems to have been continued, notwithstanding, until the middle of the seventeenth century, when the gradual introduction of coal superseded the more primitive kind of fuel.* In the methods adopted in raising the brine, great alteration also has taken place in the lapse of time; at Northwich, in Camden's time, a pit existed which furnished an abundant supply, but the way in which it was brought to the surface was crude in the extreme: the pit was provided with stairs, by means of which men descended with leathern buckets; these they filled with the water, and then ascending emptied their contents into troughs, which served as reservoirs for the wich-houses.† From manual labour they passed to the employment of horses for this purpose; water-power and windmills were subsequently used; but all have been superseded of late years by the superior efficiency of the steam-engine. The methods of evaporation have also undergone vast extension and improvement. In early times this process was conducted in small leaden vessels, six of which they had in every house in Nantwitch, and the salt was removed by women with little wooden rakes, placed in baskets, and drained.‡ These six leaden pans were afterwards exchanged for four iron ones, about 6 inches in depth and of a surface of about a square yard, capable of holding the same contents as the original leaden vessels. The limited extent of the operations thus conducted diminishes our wonder at the great proportion of wich-houses existing at these places during the middle ages, and so far surpassing the number in operation at the present day. Even so recently as a century ago, the largest pans at Northwich were only 20 feet long by 9 or 10 broad; whilst those employed forty years since had a superficies of 600, 800, and 1000 feet, with a depth of from 16 to 18 inches. The area of the pans has now, I suppose, almost reached its limit; some which I saw at Mr. Blackwell's works at Wheelock having a length of 70 feet and a width of 23 feet, making 1610 feet of surface. The heat is generally applied directly by the flue of from one to three furnaces, placed at one extremity of the pan, but in the works of Messrs. Kay, of Winsford, I found part of the evaporation conducted upon a different principle: a small iron pan, heated by a furnace in the ordinary way, is made to communicate by a narrow channel, with a brick- or clay-lined basin; this again is in connexion with others of the same description disposed around a centre, and lastly, one is arrived at immediately adjoining the first-mentioned iron pan; the brine is here by a very simple kind of pump transferred to the heated iron vessel, by which means the level of the liquid in the brick basins is kept constantly below that in the original starting-place, and thus a continual circulation of the brine is maintained.

In the preparation of salt from brine, various substances have been at different times added, from the idea of improving the quality of the product. Until recent times it was thought, that during the evaporation of an aqueous solution of chloride of sodium, hydrochloric acid was expelled, and soda formed: this doubtless arose from the decomposition of the chloride of magnesium contained in the brine with which the experiments were made,—an evolution of acid vapours having been probably observed during the incipient drying of the salt. In order to counteract this supposed evil, acids were added, and it was imagined that the excellence of the Dutch salt was due to a skilful admixture of whey which the manufacturers were alleged to make with their brine during the evaporation, which prevented the injurious effects of the free alkali. Another very favourite class of adjuncts has always consisted of substances which contain constituents possessed of the property of coagulating upon the application of heat, which clarify a liquid by entangling all suspended particles of solid matter in the meshes of their coagulum, and carry them with it as it rises to the surface. Those substances which contain albuminous or gelatinous matters are peculiarly adapted for this purpose, and are constantly used in a variety of manufactures for the attainment of this end. Blood, white of egg, glue and cows' or calves' feet have long been used in this way in salt-making.

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* Holland's *General View of the Agriculture of Cheshire*, p. 71.
† *Ibid.*, p. 48. ‡ *Ibid.*, p. 50.

In 1670 the Nantwich salt-makers are described as mixing twenty gallons of brine with two quarts of blood, and adding about two quarts of this clarifying liquid to a pan which held 360 quarts of brine. In 1810 this process was still adopted in some of the Cheshire works, but I am not aware that it is ever used at the present day. At Droitwich the use of white of egg seems to have prevailed. Various vegetable infusions, still containing albumen, as linseed mucilage and ale, were, in the early days of the manufacture, in great repute, but have, I believe, now fallen almost entirely into disuse.

In order to prevent that most unpleasant circumstance attendant upon the evaporation of all concentrated saline solutions,—the formation of a pellicle upon the surface of the liquid, which gradually becomes a thick layer of salt, and seriously impedes evaporation—another class of bodies are mixed with the brine; these are oils or butter, which, spreading over the whole area, by a peculiar molecular action prevent the formation of any pellicle, or "setting over" of the pan, as the workmen term it, and preserve that open surface which is most favourable to evaporation. The action of finely-powdered resin in effecting this is perfectly magical, the introduction of a very few grains being quite sufficient instantly to clear the surface of the largest pan, and to prevent any recurrence of the formation of the pellicle. This substance was also formerly thought to perform another function, viz., the production of a salt of finer grain; wheat-flour was also believed to exert the same action, whilst alum was added in order to facilitate the formation of larger crystals; but I believe it is now found that the regulation of the degree of heat employed in the evaporation will influence the size of the crystals with the utmost nicety, and that attention to that circumstance alone is sufficient to produce all the varieties which are found in the market. In Holland's 'General View of the Agriculture of Cheshire,' to which I am so much indebted, and to which such frequent reference has been made, will be found a list of the varieties produced at different temperatures; according to it, the finest table-salt is deposited from the brine at its boiling temperature (226° F.), and the coarsest description by slow evaporation conducted at from 100° to 110° F.

The derivation of the brine in Cheshire is too well known to require any observation: the immense beds of rock-salt which occur in the new red sandstone of that county are familiar to every one. The existence of this substance appears to have first evidenced itself by the saline springs which at various places rose to the surface; and the majority of these spontaneous appearances seem to have occurred in the immediate vicinity of the course of the river Weaver, and of the lesser stream, the Wheelock. The former of these rises in the south-west portion of the county, and after running south for some miles, turns at Audlem to the north, passes Nantwich, and after some distance, Winsford; receives the Wheelock about Northwich, and passing Marston and Anderton, proceeds to the Mersey. The Wheelock rises in the south-east part of Cheshire, and passing the village of the same name, flows by Middlewich to its confluence with the Weaver. Along the banks of these streams a continual succession of places occurs which have at various times been famous for the production of salt; and although great fluctuations have taken place, yet these have been due rather to incidental causes than to any failure of material;—imperfections in shafts allowing the admission of fresh-water springs, and a slight distance from the convenience of water-carriage, are reasons quite sufficient for the transfer of the manufacture from one place to another. Causes such as these probably led to the abandonment of the works at Dunham in the north-east of the county, and of those at Dirtwich in the south-west; yet the occurrence of brines at these places is interesting, as indicative of the position and extent of the beds of salt below, the two places being about thirty miles apart, and about equidistant from the centre of the district which is now the salt-producing one. This region may be said to lie north-west and south-east, and to be composed of three divisions,—the Northwich, the Middlewich, and the Sandbach: the first comprehends Northwich, Marston, and Anderton, besides various other places near them; the second embraces Middlewich and Winsford, with the surrounding neighbourhood; and the third, of more limited extent with respect to actual operation, includes Sandbach, Wheelock, and a few villages in the immediate vicinity. In order to obtain fair samples of the Cheshire brines, I therefore took specimens from each of the above districts. From the Northwich district I obtained two, from springs a few miles apart, through the kindness of Mr. Johnson Fletcher; the places selected in this instance were Anderton and Marston; proceeding in the south-easterly direction, a specimen was chosen from

the active department of Winsford, in the central district, and Messrs. Kay and Son furnished me with the brine which they employed; whilst in the extreme south-east, Mr. Blackwell provided me with samples from the spring which supplies his extensive works at Wheelock.

The depth at which the brine is found, and the level to which it rises, vary very much at different places. It appears that it is generally necessary to sink from thirty to fifty yards, in some cases even to a depth of eighty yards, before the spring is arrived at; the water then rises in the shaft to within from twenty to ten yards of the top, sometimes even to the surface. The general level of the brine in the pits is, however, far below this standard, as its removal by the pumps is so rapid as never to allow it to rise to its full height.

As in the case of the Worcestershire brines, I was desirous of ascertaining whether the composition of these springs varied with the different seasons of the year; with this view analyses were made in every instance of separate specimens taken respectively in January and August, and, as I had already found in the case alluded to, no difference worthy of note existed between them.

The analytical methods which have been adopted in the examination of these brines, are precisely those described in the former memoir on the Worcestershire springs; instead, however, of evaporating small portions of the waters to obtain mother-liquors and residues which might contain the rarer constituents, I obtained portions of the liquid which remains in the pans after the removal of the salt, and of the solid cake of earthy matter which adheres so tenaciously to the bottom of the pan as to require separation by the pick, and is called by the workmen "pan-scale." The former of these was tested for potassium, bromine, iodine, and phosphoric acid; and the latter for arsenic, antimony, tin, iron, manganese, aluminium, strontium, and fluorine. The brine itself was also examined for silica, for organic matter and its resultants, ammonia and nitric acid, and the metals precipitable by hydrosulphuric acid. The principal constituents of these waters are sodium, calcium, magnesium, chlorine and sulphuric acid; of the bodies occurring in less quantity,—a minute trace of potassium was found, a small quantity of iron with a little alumina and considerable traces of manganese, not, however, in proportions capable of determination. Bromine was ascertained to exist in rather large quantity, the unconcentrated brines becoming distinctly yellow upon the passage of a few bubbles of chlorine; this element was therefore determined by the method recommended by Fehling,* which depends upon the fact, that if a solution of chloride of sodium containing a small amount of bromide be insufficiently precipitated by nitrate of silver, the precipitate nevertheless contains all the bromine present; the bromine in the mixed precipitate of chloride and bromide of silver is then determined by the passage of chlorine over the fused mass in the usual way. The results yielded by this process, which were carefully and frequently repeated upon very different quantities of brine, agreed among themselves in the closest manner. The existence of iodine was proved in all the waters, but the quantity present was minute in the extreme. In one case also an indication of fluorine was obtained by the apparently etching action exerted upon a watch-glass in the application of the test now usually employed: these markings, however, on the parts uncovered by wax, although quite obvious when the newly-cleaned glass was breathed upon, were perfectly imperceptible when the same watch-glass was taken up a day or two later and re-wiped for the purpose of fresh examination.† Since that experiment, M. Nicklès's observations‡ on the fallacies incidental to this method of testing have appeared; and this doubtless was a case such as he describes, in which the vapour of any acid, or even of water, may exert such an action (not chemical, I presume, but physical), and fix upon glass any design at first traced upon the layer of wax. The search for the remaining substances above mentioned was unsuccessful, and they were therefore presumed to be absent.

I will now proceed to state the results which the analysis of these brines has afforded me, premising them simply by naming the sources from which they were derived. I. Andertone brine, from the pit of Lord Stanley of Alderley. II.

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* Fresenius, *Quant. Analysis*, p. 345. 2nd Engl. edit.

† I accounted for this at first by imagining that a thin film of wax might be impressed by the needle upon the glass, which was not immediately removable by the first cleansing.

‡ *Comptes Rendus*, March 30, 1857, p. 679.

Marston brine, from the works of the executors of the late C. W. Newman, Esq. III. Winsford brine, from the shaft of Messrs. Kay and Son. IV. Wheelock brine, from the works of Mr. Blackwell.

	1. Anderton Brine.	2. Marston Brine.	3. Winsford Brine.	4. Wheelock Brine.
Specific gravity of brine	1.2048	1.2001	1.2049	1.2013
Reaction of brine .	Feebly alkaline	Feebly alkaline	Slightly alkaline	Feebly alkaline
Saline matter contained in a gallon of the brine.	Grains.	Grains.	Grains.	Grains.
Chloride of sodium	21704.712	21187.234	21528.550	21302.773
Bromide of sodium	8.686	9.240	13.326	16.986
Sulphate of lime .	382.885	328.467	379.543	351.500
Carbonate of soda	19.397	30.242	26.989	.....
Carbonate of lime	1.686	.....	5.060	43.727
Carbonate of magnesia ...	63.252	89.887	155.191	84.977
Sulphate of soda .	.....	122.650	.....	.....
Chloride of magnesium...	.....	.....	.....	143.795
	22180.618	21767.720	22108.659	21948.758

Towards the latter part of the autumn of last year, a considerable panic was created by a sudden outcry being raised that the supply of brine was rapidly diminishing over the whole of Cheshire. I made at the time many inquiries as to the truth of this statement, which had found its way into the public journals, and it proved, as is usual in such cases, that the account, although based upon truth, was very much exaggerated. A diminution in the supply of brine is a phenomenon of no unfrequent occurrence, and is in fact of two kinds—periodical and occasional. A periodical sinking of the water in the brine-shaft is found to occur in the summer season, the brine rising with the approach of winter, and attaining its highest level about December or January: these alternations have generally been very regular, but during the year 1856 a total departure from the usual variations took place, which, ending in a rapid sinking of the brine during the months of November and December, originated the fears which were entertained of a general failure being at hand. I have been enabled to obtain a statement of the fluctuations in the level of the brine in a pit at Anderton, during the two normal years 1854-55, and the abnormal year 1856, by which the matter is clearly exemplified. The shaft upon which the observations were made, was between 70 and 80 yards deep, and the numbers given express the height in yards to which the brine rose.

	1854.	1855.	1856.
January	15—16	30	24—30
February		35	23—24
March	10—7—35—20	gradually receding	18—24
April	gradually receding		18—19
May.....			17—19
June			17½—19
July.....	6	4	17—19½
August	7	4	19—19½
September	7	4	19—20
October	8—20	increasing	20—22
November	20—25	22	18—11
December	30	30	10—11

By this account it is seen that in ordinary years the average depth of brine in the shaft is thirty yards in the depth of winter, whilst in the midst of summer five yards may be taken as the mean; and the origin of the alarm in 1856 was evidently the observation of a diminution setting in at a period at which an increase had usually happened hitherto. The fact, however, appears to have been disregarded, that in the warmer period of the year the supply of brine had been far more abundant than was generally the case, nor am I aware that any attempt was made to explain this part of the phenomenon. The sudden decrease was attributed by those on the spot best able to form an opinion, to one of those dislocations of strata which frequently on a smaller scale cause the occasional failures in the supply of brine: a sudden subsidence of land in one part of the Northwich district, to the depth of a three-storied building, is described as having occurred simultaneously with this sinking of the brine, and it was believed that in some of the deserted mines which honeycomb the rock-salt strata of that region, the pillars of salt, which are always left to support the roof, had been removed by the action of water, and the immense weight of the superincumbent mass had then caused the excavation to collapse. By an extensive disarrangement of this nature, either some new channel of escape might have been opened for the brine, or at least the communication between some of the streams or reservoirs might have been closed or interrupted. Similar occurrences, although with a converse effect, have happened in earlier times; and two instances are mentioned by Holland, in one of which, near Bickley, and also in the neighbourhood of Combermere Abbey, the ground suddenly sank to a depth of many feet, and the brine not being removed with the same rapidity as in the present day, forced its way to the surface upon its old subterranean channel or reservoir being filled up, and formed a pool of considerable size in the depression caused by the collapse of the strata.

The failure of 1856 appears to have been partial only, as would be naturally expected if due to the alleged cause; it seems to have been almost wholly confined to the Northwich district: at Winsford it was slightly felt, but was there attributed more to increased pumping than to any natural cause; whilst in the Sandbach department I believe no complaint of any kind was raised. The derangement, such as it was, seems to have been only temporary, for no complaints have since been made of the occurrence of any scarcity.

ON THE LIQUOR POTASSÆ ARSENITIS OF THE LONDON PHARMACOPŒIA.

Some of the higher authorities in pharmacy have given it as their opinion (*Phar. Journal* for May, 1857, page 543) that no chemical decomposition arises on boiling arsenious acid with carbonate of potash in making the liquor potassæ arsenitis of the Pharmacopœia. Not seeing why a reaction should not take place, I determined to make experiments in order to satisfy myself if such was the case or not. I first boiled carbonate of potash (KO, CO_2) with excess of arsenious acid, and passed the vapour through lime water contained in a Wolfe's bottle; in the lime water I obtained an abundant precipitate of carbonate of lime, clearly indicating decomposition of the carbonate of potash.

After allowing the liquid to cool, in order to let the arsenious acid, which would have been dissolved by the boiling water, deposit, I filtered and evaporated the liquid to a syrupy consistence, and placed it over sulphuric acid for some time, in order to see if it were possible to obtain crystals, or a crystalline substance, but failing in that, I evaporated it carefully to dryness, and made an analysis of the substance dried at 100° C. This yielded 73.976 per cent. of arsenious acid. The percentage of arsenious acid contained in a substance of the formula KO, AsO_3, presuming that such is the composition of arsenite of potash, would be 67.757—my substance, therefore, contains a little more than six per cent. of arsenious acid in excess, as expressed below:—

73.976 percentage of AsO_3 in substance examined.
67.757 percentage of AsO_3 in the (KO, AsO_3).

6.219 excess of arsenious acid.

I tried to get rid of this excess of arsenious acid, by treating the substance with cold water, filtering from the undissolved arsenious acid, evaporating to dryness, again treating with cold water, and repeating this until it dissolved in water, without

leaving a residue; but I found, on analysis, that it had made little difference in the percentage of the arsenious acid.

Another experiment was made by boiling carbonate of soda (NaO, CO_2) with excess of arsenious acid, treating it precisely in the same manner as the compound with potash; but I was equally unsuccessful in obtaining crystals or a crystalline substance.

This substance, dried at 100° C. was found to contain 82.382 per cent. of arsenious acid. The percentage in a compound of the formula (NaO, AsO_3) would be

76.1538 : 82.3820 percentage of AsO_3 in substance examined.
76.1538 percentage of AsO_3 in (NaO, AsO_3).

6.2282 excess of arsenious acid.

As exhibited above, the soda compound with arsenious acid had more than six per cent. of acid in excess, just as the compound with potash. I considered it advisable to make a complete analysis of this substance the; results were as follows:—

82.382 per cent. of arsenious acid.
17.409 per cent, of soda.

99.791

These results were checked by a second analysis, and the following numbers were obtained:—

82.30 per cent. of arsenious acid.
17.31 per cent. of soda.

99.61

Seeing that a perfect decomposition of the carbonate of potash and carbonate of soda might be effected by using an excess of arsenious acid, I then tried the exact proportions ordered in the London Pharmacopœia for making the liquor potassæ arsenitis, viz., equal parts of arsenious acid and carbonate of potash. I weighed very accurately five grammes of each, and boiled them with ten ounces of distilled water in a flask, until all the arsenious acid was dissolved. After boiling, there remained six ounces of liquid. I then determined the percentage of carbonic acid in it, and instead of finding .8535 per cent., which I should have found had no decomposition taken place, I only obtained .334 per cent. By calculation, I find that if the arsenious acid had decomposed its equivalent of carbonate of potash, the solution should have contained .2575 per cent. of carbonic acid, which is only about $\frac{7}{100}$ of a per cent. less than I really found.

I think this clearly shows that a decomposition of the carbonate of potash does take place, and the solution contains arsenite of potash and undecomposed carbonate of potash, the undecomposed carbonate being due principally to the fact, that more carbonate of potash is used than the arsenious acid is capable of decomposing.

9, *Walpole St., King's Rd., Chelsea.* Henry K. Bamber, Analytical Chemist.

[This communication is published here at the request of the author, although we thought, and are still of opinion, that the subject would have been better disposed of by having Mr. Bamber's paper read and discussed at the next Pharmaceutical Meeting. There are some inaccuracies in Mr. Bamber's statements, and the conclusion to which he arrives is, we believe, entirely wrong. The subject, however, is not devoid of interest, and as a difference of opinion appears to exist with reference to the composition of an important medicine, we still hope that whatever has to be said on either side of the question may be made subject-matter for discussion at a meeting. With a view to this result, the subject will probably be mooted at the next Pharmaceutical Meeting, to be held on the 3rd of March.—Ed. Ph. Jour.]

POISONING BY DIGITALIS.

The following case, taken from the *Leeds Mercury* of February 13th, has been forwarded to us by a correspondent, who states that Pereira gave tincture of digitalis in drachm doses, and that he had met with cases in which it had been given in half and even one ounce doses without any ill effects. Our correspondent wishes to know if any member or medical man can give an instance in which so small a dose as four drops proved fatal :—

"An inquest was held before Mr. Jewison, coroner, at the house of Mr. Pearson, the Unicorn Inn, Carlton, on Saturday evening, on view of the body of a girl named

Mary Ann Brown, sixteen years of age, who died on the 4th inst., under the following circumstances. Some weeks ago, the girl began to have sore ears, when a neighbour recommended the mother to apply an ointment made from foxglove leaves and hog's lard. The ointment was applied three times, when the girl died. From the evidence of Mr. Jewison, surgeon, it seemed that the child had been poisoned by the application of the ointment, it being too strong, and applied externally. In his opinion, four drops of tincture of foxglove was sufficient to poison an adult. Verdict accordingly."

POISONING BY LAUDANUM.

On Wednesday, February 3rd, Mr. Wilde, late traveller for Mr. Clarke, spirit merchant, of Worcester, committed suicide by taking laudanum. He had been much addicted to drinking, and was in the habit of using laudanum to allay the pain from an ulcer in his leg. At the inquest it appeared that he had been intoxicated on Saturday, Monday, and Tuesday, and on Wednesday the landlady of the Brewer's Arms Tavern, where he lodged, heard a gurgling noise, and on entering his bedroom the deceased was found in bed in a dying state. Mr. Walsh, surgeon, came, and asked if he had been taking laudanum? Deceased replied, "Yes, an ounce, and I threw the bottle out of the window." An emetic was ordered, and every effort was used to keep the patient in active motion, but he died suddenly during those efforts. A verdict was returned, "That deceased destroyed himself in a fit of temporary insanity."

POISONING BY OPIUM.

On Tuesday, February 2nd, Mr. Baker received information respecting the death of John Tarvey, aged 60 years, who died from the effects of a narcotic poison. It appears that the deceased, feeling unwell, sent his wife to a chemist, who gave her some opium pills, which he took, and retired to rest. He slept for eleven hours, when the wife became alarmed, and sent for Mr. Simpson, a surgeon, of the City Road, who found the deceased in a state of insensibility. Antidotes were administered, but the deceased expired from the effects of poison.

POISONING BY SALT OF SORREL.

On Saturday afternoon, Mr. Rutter held an inquest at the Church Inn, Higher Hurst, on the body of Ann Vaughan, aged 65. On Wednesday morning, the deceased, who lived with her daughter, got up about nine o'clock, complained of not being well, said she would take some medicine, and instructed her daughter to reach some Epsom salts out of a corner cupboard. The daughter took out a parcel which she believed to be salts, and the deceased mixed the contents of the packet with some water and drank it. The daughter having gone to a neighbour's house, returned in a short time, and found her mother very ill, and she then saw a label on the floor, "Beware.—Poison." Being alarmed, she sent for a surgeon, but before his arrival the poor woman had expired. A *post-mortem* examination being made by Mr. Chorley, he found the body healthy, except the thorax, the stomach, and the intestines, which were charred by some corrosive poison, and it appeared that the deceased kept what is generally called and sold for salts of lemon for the purpose of removing stains from linen, and the surgeon remarked that salts of lemon would be harmless, but many druggists sold oxalate of potash for salts of lemon, and they would produce similar effects to those he found on examination. The jury being satisfied that it was a mistake, returned a verdict to that effect.—*Manchester Guardian.*

SEAMEN POISONED BY HEMLOCK.

H.M.S. Wellington sailed from Campbeltown with a fair wind on Monday morning last. On the previous Saturday a boat's crew of twelve men, while on shore, dug up a quantity of hemlock, which they mistook for wild celery or parsley. The men who partook of it, eight in number, became very ill, and two of them—the ship's corporal, named Welsh, and a seaman—died suddenly on the same day. The latest information received from the vessel states that four of the others were dangerously ill on Sunday afternoon.—*Greenock Advertiser.*

SUBSTITUTE FOR LARD IN OINTMENTS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—In consequence of the objections to lard in the making of ointments, I was led to try an experiment, for the purpose of producing an ointment which would readily wash from a wound without the addition of soap or any other agency save water, of good consistency, not variable with change of temperature, easily miscible with substances soluble in water, and free from oxidation. As far as theory goes, I can see no evidence to show why the following formula could not be advantageously adopted:—

℞ Powdered Fuller's Earth
Glycerine āā ℥j ♏

The fuller's earth should be in an impalpable powder, and to produce this with the least degree of trouble, I place a quantity of the earth in a dish, and pour a little water on it. In a few minutes it is perfectly slaked. Place it in the oven to dry. When perfectly dry, powder it, and pass it through a fine sieve. Of this powder and glycerine take equal parts, and mix thoroughly in a jar with a palette knife, *without* the aid of heat. Its consistency is perfectly under the control of the operator, as he can modulate the quantities of the earth or glycerine to suit his purpose. The *healing* and *non-irritating* qualities of fuller's earth need scarcely be alluded to, but it appears to form an item in its favour. I may also state that it is easily miscible with fats, if required. This appears to be owing to the peculiar solvent action of the fuller's earth on greasy substances. It will not be so liable to irritate as starch, on account of the healing properties of the earth. The subject is worthy of investigation ; and if those interested in the subject would consider the matter, I have little doubt but that there may be merits found connected with the formula which at first sight may not appear.

Feb. 15, 1858. James J. T. W. Smith.

PHOSPHORIC AND PHOSPHOROUS ACID.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—At page 412, vol. xvii. *Pharm. Journ.*, Professor George Wilson is reported to have stated that "M. M. J. Personne has shown that even in large doses these acids are *quite innocent;*" whilst M. Pagels (*Chemical Gazette*, Jan. 15th, 1857, fol. 34) states "that the phosphoric acid, prepared with nitric acid and phosphorus, for internal administration, should be tested* with perchloride of mercury for phosphorous acid, *as the latter is poisonous.*"

Will the competent reader of the *Pharmaceutical Journal* be pleased to inform us, whether of the two be correct ?

Having to prepare largely the "Acidum Phosphoricum Dilutum," P.L., I confess that I am, and no doubt others are, interested in the question.

I have never found phosphorous acid in phosphoric acid, when reduced to the "syrupy condition ;" in fact, prior to this, the PO_3 inflames, emitting phosphuretted hydrogen, whilst the PO_5 is retained.

I remain, most respectfully, dear Sir, your most obedient servant,

Feb. 8, 1858. George Whipple, F.C.S.

ROYAL INSTITUTION.

The Friday evening meetings of the Royal Institution were commenced on the 22nd of January, when the chair was occupied by W. Pole, Esq., Treasurer and Vice-President. The discourse for the evening was delivered by Professor Tyndall, "On some Physical Properties of Ice." Some phenomena of the crystallization of ice were shown by means of the photo-electric microscope. The manner in which the molecular aggregation was affected, when a beam of radiant heat was sent into the interior of a mass of ice, was examined. The track of such a beam presented a beautiful appearance. Flattened spheroids were observed, which, at certain in-

* Sir H. Davy, 1812.

cidences of the light, shone with more than metallic brilliancy, and around each a liquid flower, consisting invariably of six petals, was formed. The spot at the centre of each flower was proved to be a vacuum ; and the formation of the flowers in a piece of ice, through which a beam of electric light was transmitted, was rendered visible to the audience.

The air and water cavities, which, in the case of glacier ice, have caused so much discussion, were next examined. It was proved that the water was due to the melting of the ice round the air cavities. The hypothesis propounded by M. Agassiz and the Messrs. Schlagintweit, to account for this water, and which has hitherto been universally accepted, is, that the ice permits the radiant heat to pass ; the heat warms the air, and it, in its turn, melts the ice. It was proved by the speaker that this view is wholly untenable. One of its consequences would be that a bubble of air would be capable of absorbing in a few minutes a quantity of heat, which would raise its temperature upwards of 400,000 degrees, or more than 160 times that of fused cast iron. The melting of the ice was shown to be a simple consequence of the dynamical theory of heat. Molecular motion is transmitted through the solid ice, without prejudice to its solidity, and detaches the particles at the surface of the internal cavity, as the last of a series of elastic balls is detached by a force, which has traversed a row of them without producing visible separation.

On the 29th of January, Mr. Grove delivered an address "On Molecular Impressions produced by Light and Electricity." The term molecular, said Mr. Grove, is used in different senses by different authors; it is used this evening to signify the particles of bodies smaller than those having a sensible magnitude, or as a term of contradistinction from masses. To show how greatly the effects of light and electricity depend upon the molecular organization of the bodies subjected to their influence, reference was made to the different molecular states of carbon. In the form of diamond, carbon transmits light, but stops electricity; while in the form of coke or graphite, into which the diamond may be transformed by heat, the same carbon transmits electricity, but stops light. Some of the theories of light were referred to, and a preference given to that originally propounded by Leonard Euler, who conceived that light may be regarded as a movement or undulation of ordinary matter. Dr. Young urged in opposition to this theory, that if it were correct all bodies should possess the properties of solar phosphorus, or should be thrown into a state of molecular vibration by the impact of light, just as a resonant body is thrown into vibration by the impact of sound, and thus gives back to the sentient organ an effect similar to that of the original impulse. Mr. Grove gave a quotation from the last edition of his "Essay on the Correlation of Physical Forces," where he stated, "to the main objection of Dr. Young, that all bodies would have the properties of solar phosphorus if light consisted in the undulations of ordinary matter, it may be answered, that so many bodies have this property, and with so great variety in its duration, that *non constat* all may not have it, though for a time so short that the eye cannot detect its duration." The proof of this has an obvious bearing on the establishment of the theory referred to, and several experiments were adduced to show that bodies which have been exposed to strong light or to electricity often retain, for a time, the power of producing impressions upon sensitive matter. The experiments of M. Niepce de St. Victor were especially referred to, in which an engraving which had been for some time in the dark was exposed to sunlight as to one half, the other half being covered by an opaque screen; it was then taken into a dark room, the screen removed, and the whole surface placed in close proximity to a sheet of highly sensitive photographic paper. The portion upon which the light had impinged was reproduced on the photographic paper, while no effect was produced by the portion which had been screened from the light. Mr. Grove feels deeply convinced that a dynamic theory, one which regards the imponderables as forces acting upon ordinary matters in different states of density, and not as fluids or entities, is the truest conception which the mind can form of these agents; but to those who are not willing to go so far, the ever-increasing number of instances of such molecular changes affords a boundless field of promise for future investigation, for new physical discoveries, and new practical applications.

On the 5th of February, Dr. Lankester took as the subject of his discourse, "The Drinking Waters of the Metropolis." The object of this discourse was to point out the nature and extent of the contaminations of the water used for drinking in London and its neighbourhood. Brief allusion was made to the important uses of

water as a constituent of organized bodies, and to the way in which it is distributed over the earth, its first source being the ocean. The principal ingredients of the deep and shallow well-waters of London were enumerated, and the presence of some of them demonstrated by the application of tests to specimens of such waters. The supposed influence of these ingredients on the health of those drinking the waters was referred to, and an opinion expressed in favour of those waters most free from the salts usually held in solution by well waters, notwithstanding that waters containing considerable quantities of such saline matters are generally preferred by the public for drinking. The absurd bugbear of the living monsters, found in the water we drink, was paraded upon the walls of the theatre, and a disposition was manifested throughout the discourse to magnify the supposed evils of the existing water-supply of London. The shallow wells were wholly condemned, because they contain *carbonic acid in considerable quantities*, chloride of sodium, ammonia, nitrates, and living and dead organic matter. Even the old adage, that "the proof of the pudding is in the eating," was denied; for it was asserted that the waters most sought after and esteemed for drinking, contain the largest quantities of the salts to which exception was taken. The storing of waters in lead cisterns was objected to, but no attempt was made (very wisely) to show that any of the London waters are liable to become contaminated with lead from such source. The general tendency and effect of Dr. Lankester's communication was to show that, although much has been done towards improving the water-supply of London, yet much still remains to be done before the waters of the metropolis will be in a satisfactory state, and that we must not hope for anything good and pure if we resort to the shallow wells.

On the 12th of February, the Prince Consort occupied the chair, and Professor Faraday delivered a discourse "On Static Induction," to a numerous and distinguished audience, such as usually fill the theatre on such occasions. There was nothing new in the matter of the discourse; even the happy way in which the subject was made intelligible to every understanding, was but the habitual method of the lecturer. The selection of this subject for a Friday evening's discourse appeared to have arisen from a wish expressed by some of those attending the Institution to be assisted in forming a more definite notion of what is meant by Electrical Induction. The apparatus used was of the most simple description, yet every point was brought out to demonstration, and no one could have quitted the theatre without feeling that the intricate parts of the subject had been made perfectly intelligible.

OBITUARY.

JAMES WOOLLEY.

The Pharmaceutical Society has sustained a great loss in the decease of one of its most active Members, Mr. James Woolley, of Manchester, who has for many years performed the duties of Local Secretary, and taken a leading part in all movements relating to the interests or advancement of Chemists and Druggists.

Mr. James Woolley was the fourth child of George Woolley, of Dukinfield, near Ashton-under-Lyne, and was born on the 26th day of October, 1811. Before the age of nine years he was placed under the care of his uncle, the Rev. James Whitehead, of Ainsworth, near Bolton, where he received his early education. In 1826, Mr. Whitehead relinquished his school; on which, James Woolley was removed to that of the late Rev. John Gaskell, of Dukinfield. At the age of sixteen, he was apprenticed to the late Mr. Samuel Dean, Druggist, of Manchester; and, at the conclusion of his apprenticeship, he entered the University of Edinburgh, where he chiefly attended to those branches of study which related to his future profession. About Christmas, 1833, he commenced business as a Chemist and Druggist in King Street, Manchester; and on the 18th of January, 1836, he was united in marriage with Miss Johns, niece of the late Rev. William Johns, of Manchester.

During the early proceedings of the Pharmaceutical Society, a deputation from London invited the Chemists of Manchester to hold a meeting in that city with a view of extending the influence and utility of the Society by the establishment of an effective branch in that locality. In this movement Mr. Woolley

took an active part; and although some doubts were at first expressed as to the probable advantage or propriety of taxing the Chemists in provincial towns to support what was then supposed to be a London Society, this hesitation shortly subsided, and the advantage of the union and co-operation of the Chemists of the entire kingdom for the protection of their interests and the advancement of their professional status was generally acknowledged. The influence and active exertions of Mr. Woolley contributed greatly to this result, and being supported by the leading Chemists of Manchester, Rochdale, and the neighbouring towns, the Manchester Branch, of which Mr. Woolley officiated as local Secretary, became a most effective auxiliary of the parent Society.

Mr. Woolley had long been connected with several of the local institutions, in the government of which he took an active part. For upwards of twenty years he was a director of the Mechanics' Institution, to the prosperity of which his active personal exertions greatly contributed; he was constant in his attendance at the meetings of the Board of Management, never allowing any other engagement to interfere.

He had for the last six years been a member of the Town Council, as representative of the Exchange Ward, and was rapidly acquiring considerable influence in that body by his sound sense and straightforward, honourable conduct.

He was also a member of the Council of the Manchester Literary and Philosophical Society, for which his extensive scientific acquirements admirably fitted him.

In anything affecting the interests of the Chemists and Druggists in his locality his counsel and assistance were always sought, and any plan for improving the educational status of the body was certain to receive his active co-operation. In the proceedings of the Manchester Pharmaceutical Association he took an active part, having been a member of the Committee from its formation, and its President during the year 1855-6, and in the earlier years of its existence assisted in delivering a course of lectures on chemistry to its students.

Mr. Woolley died on the 30th of January, after a severe illness of several weeks. He had for more than a year been in delicate health.

His remains were interred on the morning of the 5th of Feb., in the recently-formed Salford Borough Cemetery.

BOOKS RECEIVED.

An Introduction to Practical Chemistry, *including Analysis*. By John E. Bowman, F.C.S., &c. Edited by Charles L. Bloxam, Professor of Practical Chemistry in King's College, London. Third Edition. London: John Churchill, New Burlington Street. 1858. (From the Publisher.)

Researches on the Cinchona Alkaloids. By W. Bird Herapath, M.D., &c., &c. (From the Proceedings of the Royal Society for Nov. 26, 1857.)

TO CORRESPONDENTS.

A. R. A.—The instructions respecting the payment of Annual Subscriptions are addressed only to those who pay Annual Subscriptions, and of course are not applicable to Members, Associates, and Apprentices, who have paid fees in lieu of Annual Subscriptions. To prevent any further misunderstanding on this subject, we quote the following extracts from the Bye-Laws:—

SECTION I.

9. Associates, being such prior to the 1st day of July, 1853, shall pay the Annual Subscription of 10*s.* 6*d.*

10. Associates, admitted as such prior to the 1st day of July, 1853, shall, upon becoming Members, pay the Annual Subscription of One Guinea, or in lieu thereof the sum of Ten Guineas as a Life Member's Subscription.

11. Registered Apprentices and Students, being such prior to the 1st day of July, 1853, shall pay the Annual Subscription of 10*s.* 6*d.*

12. Registered Apprentices or Students, admitted as such prior to the 1st day of July, 1853, shall, upon becoming Members, be subject to the same conditions as Associates admitted before that date.

P. W. K. (Stirling).—(1.) *Silvering Glass*, vol. xvii., page 248.—(2.) *Silvering Powder for Coating Copper.*—Nitrate of silver, 30 grains; common salt, 30 grains; cream of tartar, 3½ drachms: mix. Moistened with water, and applied.—(3.) Bowman's *Introduction to Chemical Analysis.*

J. T. (Glasgow).—*Acidum Nitro-muriaticum Dilutum.*—Equal parts of the dilute nitric and muriatic acids.

J. D. (Keswick) recommends the use of india-rubber caps for bottles containing dangerous medicines as a means of preventing accidents, by ensuring attention.

T. S. (Norwich).—(1.) The process of tinning cast-iron is tedious and complicated. *See* Ure's *Dictionary of Arts, Manufactures, &c.* — (2.) *Staining Ivory*, vol. xvi., page 440.

Tyro (Exeter).—(1.) The process alluded to for making Phosphate of Zinc is quite correct.—(2.) There is no published formula for *Glycerine cum Ferri Iodido.*

W. N. B. (Sunderland).—Tomes's *Dental Physiology and Surgery*, 12*s.*

W. H. (Longton).—Animal charcoal would answer the purpose.

An Associate (London).—Chevreul's works are not published in England.

A Student (Brighton).—(1.) Apprentices or Students may undergo the Classical Examination by any Clergyman, Minister, or Schoolmaster, *not having been the Teacher of the Candidate*, or any Physician or Surgeon.—(2.) Application for admission to the Chemical Society should be made to the Secretary.

Chemicus (Manchester). — (1.) *Quevenne's Iron*—Ferrum Reductum,, vol. xiii., page 332.—(2.) Sulphur is sometimes used for destroying insects on plants, but it requires care.

An Inquirer (Bradford).—We are unable to give the information.

Operator (Manchester). — (1). Wittstein's *Practical Pharmaceutical Chemistry* (Churchill), 6*s.* 6*d.*—(2.) A hard glass retort would answer the purpose.

A Subscriber (Kentish Town).—Kousso is generally given in doses of half an ounce, in the form of infusion.

M. P. S. (Yarmouth) has sent some remarks on the Dental profession, which we may have occasion to notice on a future opportunity.

Messrs. Barton Brothers (Brighton).—The observations on the Poison Bill will be preserved with other documents on the subject, which at present is postponed, but will probably be resumed at a future time.

W. G. K. (Market Drayton).—The Liniment made according to the recipe sent us, with compound tincture of iodine, compound camphor liniment, and cod-liver oil, when first prepared, is of a deep-red colour, caused by the free iodine. This colour, however, gradually becomes less, and after many days there is but little colour left. The diminution of colour appears to arise from the combination of the free iodine with the ammonia of the compound camphor liniment.

E. W. (Brighton).—The prescription referred to orders "Sodæ et Ferri Pyrophosphatis, āā gr. iiss;" by which we conclude the prescriber intended to order the two salts, pyrophosphate of soda and pyrophosphate of iron, of each 2½ grains, and not 5 grains of the double salt.

J. F. (Reading).—(1.) Refer to some elementary work on chemistry.—(2.) No.

W. P. wishes to know the best and readiest mode of destroying and preventing vegetation in the thatch of buildings. We think a solution of chloride of zinc is worth trying.

Instructions from Members and Associates, respecting the transmission of the Journal, to the Secretary, 17, Bloomsbury Square, before the 20th of the month.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XVII.—No. X.—APRIL 1st, 1858.

MEDICAL REFORM AND THE SALE OF POISONS.

Last Session there were two rival Medical Bills before Parliament, and the natural result was what occurred,—namely, the failure of both. When doubts exist, and a cross fire takes place between two conflicting parties on such a subject, both professing to be going in the same direction, it is to be expected that some votes given with an intention favourable to the general object will neutralize each other, and that some voters, not being much interested in the question, and imperfectly understanding its merits, will deem it the safer course to oppose both.

The appearance of three Medical Bills seemed in the first instance to increase the difficulty, the chances being two to one against each; but symptoms of a compromise having been manifested, it is possible that a favourable reaction may take place. Lord Elcho's Bill was first in the field, having been introduced on the 16th of March. On the 23rd, Mr. Cowper introduced his Bill, which had been prepared by the Board of Health under the late Government. The following outline, which appeared in the *Times* of the 24th, will give a general idea of its principal provisions:—

"1. The present legally constituted examining bodies in England, Scotland, and Ireland respectively, to be re-enacted as the 'Examining Authority,' under the Act for England, Scotland, and Ireland respectively; not to be touched in their several rights of giving titles of honour; but their certificates, if purporting to confer any claim to registration as 'legally qualified practitioner,' to be subject to regulation as under:—

"2. A Council to be established, as nearly as may be, representative of all interests concerned, taking as a basis (but subject to modification in detail) Mr. Headlam's proposal that it should consist of seventeen delegates from the different examining bodies, with six members appointed by the Crown.

"3. The Council to have the right of attendance by its members or by deputy at any examination held for the purposes of the Act.

"4. The Council to have power, after due public notice, and with the approval of Her Majesty in Council, to make orders and regulations as follows:—

"A. As to the form of keeping the general register and such special registers as may be kept; and as to the payment of registration fee by admitted candidates.

"B. Fixing, in respect of age, study, knowledge, and examination, the conditions under which the future candidate shall be admissible to the medical profession as a qualified medical practitioner.

"C. Determining, in respect of the several Examining Boards of the United Kingdom, what share may be fulfilled by the certificate of each of them acting separately, or by the certificate of two or more of them acting conjointly, as contributory to the total certification which shall give admission to the register.

"D. Disallowing the future certificates of any Board which shall conduct its examinations inefficiently or irregularly.

"E. Establishing, or causing to be established, examination in particular branches of knowledge, professional or preliminary, where arrangements for such examination shall not have been otherwise sufficiently provided.

"5. The Council to have power to disregister persons convicted of crime, or guilty of infamous conduct in any professional capacity.

"6. The register and its titles to be protected from falsification; and non-registered persons to be excluded from professional privileges.

"7. Every registered person to be entitled to practise according to his qualifications in any part of the United Kingdom."

On the introduction of this Bill, Mr. Walpole said he considered it the best proposition he had heard on the subject; and Lord Elcho said it was precisely

the same measure which he had introduced in 1856, and that he was prepared to modify that part of his Bill which related to the appointment of the Council in the direction of that of Mr. Cowper. By this compromise, the two Bills would be made so nearly to assimilate, that further opposition between them might be at an end. We have not yet seen the particulars, or any discussion respecting the third Medical Bill, which we conclude to be similar to the one introduced last year by Mr. Headlam. The subject will be considered by the Council of the Pharmaceutical Society at the next meeting, and if occasion should require, will be referred to a Committee. We believe it is not intended to interfere with the Pharmaceutical department, or the trade or business of a Chemist and Druggist, but it will be necessary to consider and take legal advice as to the operation of the exempting clause, so as to be assured that it will effectually answer its professed object.

With regard to the sale of poisons, it appears probable that the question will shortly be taken up by the present Government, and that the interview on behalf of the Pharmaceutical Society which had been arranged with Lord Granville prior to the change in the administration, will take place with the Secretary of State for the Home Department. The report of the Council of the Society was published in our last number, and the Committee with whom it originated continues to be in readiness to resume the consideration of the subject in case of need during the interval between the ordinary meetings of the Council.

ON THE INTRODUCTION OF NEW OR IMPROVED PREPARATIONS.

The advancement of the art and science of Pharmacy has always been kept prominently in view as a leading object of the Pharmaceutical Society, and there are three modes in which this may be promoted—first, by the introduction of a better system of education; secondly, by the invention or discovery of new chemical products applicable to Pharmacy; thirdly, by the adoption of better or more scientific principles in ordinary pharmaceutical preparations.

By the general improvement of education the labour of these investigations will be divided, and the contribution of practical information from various quarters will add to the common stock of knowledge. The Pharmaceutist, being prepared by education and the habit of scientific study to take advantage of the progress of chemistry, valuable additions may be made to the Materia Medica by the application of discoveries or principles, the result of researches undertaken with other objects by the votaries of abstract chemical science. For example, in this manner such agents as chloroform, amyline, pepsine, &c., have been introduced into practical use, having originally been known and explained theoretically, among other products or principles, in the lecture-room.

Among the pharmaceutical preparations already in use, many of which have been long known to the profession, considerable improvements have taken place. For example, the mode of preparing some of the medicinal extracts, the preservation of plants in the dry state, the separation of their active principles, and the manipulation of several ointments and plasters, have, within the last twenty years, acquired increased importance and value from the improvements which have taken place. These, and other subjects of a similar nature, have been discussed at meetings of the Pharmaceutical Society, and the result has been published in the Transactions; by which means the practical benefit arising from these investigations has been extended, and the store of knowledge placed within the reach of all those who may be disposed to avail themselves of it.

The suggestion of the Members of the Society in Aberdeen (which will be found in page 504) contains nothing beyond what was announced in the first number of this Journal, and which we have endeavoured to carry out up to the present time. We are nevertheless glad to receive, in the communication before us, a satisfactory evidence of the interest taken in a subject which it is

our desire not to lose sight of. In the original scheme or plan of the Society, it it was stated to be one of its prominent features, that it would furnish an arena for the discussion of chemical and pharmaceutical processes, and improvements in medicinal preparations, and that the result would be published for the information of the profession. It was also remarked that in the consideration of such subjects, the assistance of the members of the Medical Profession would be valuable, as it is by the joint labours of the medical man and the Pharmaceutist, that defects or deficiencies in the medicines now in use can be mutually made known and improvements introduced.

At some of our early meetings the Syrup of Iodide of Iron, the best mode of preparing which had not previously been well understood, was fully discussed and satisfactorily settled. Interesting practical discussions have also taken place on tinctures and infusions, compound decoction of aloes, cod-liver oil, soap liniment, the citrates and valerianates of iron, unguentum hydrargyri nitratis, Donovan's solution of iodine and mercury, and his preparation of bark, the cyanide of potassium, hyrax capensis, kosso, chloric ether, chloroform, amyline, gun cotton, collodion, various compounds of iron, zinc, manganese, cadmium, &c., with many other preparations of minor importance. Most of these have been introduced at meetings of the Society, some have been merely published in the Journal, andwe are not aware of having omitted to notice any new or improved remedies of practical value or importance. Medical practitioners or others who desire to introduce preparations to the notice of the profession, are invited to send papers to the Pharmaceutical meetings. In some cases the authors prefer publishing their remarks in the Journal. Occasionally we find suggestions of the nature referred to in the medical journals, from which we quote them when they appear entitled to the attention of our branch of the profession. In alluding to such articles, it is necessary to refer to their medicinal properties, the usual mode of application, the dose, and other particulars not strictly belonging to chemistry; but the nature of the subject requires the joint attention of the medical man and the Pharmaceutist, in order to arrive at a successful result.

We sometimes meet with new preparations, or variations of those commonly in use, the object of which is obviously rather to acquire publicity, than to confer any real benefit on medical or pharmaceutical science. Sometimes an arrangement exists between a medical man and a Chemist, and the prescriptions are written "stenographically," so as not to be generally understood. Such cases are scarcely deserving of notice, but whenever any formulæ of this description come within our reach, we invariably publish them, for the information of the profession.

The multiplication of similar remedies, having only slight variation, is not calculated to produce any advantage. The Materia Medica, comprising the numerous compounds in the several Pharmacopœias, is already sufficiently extensive, and any needless additions would be rather an encumbrance. If it can be shown that any change, or the introduction of a new remedy, would be a positive improvement, then such step is desirable; but otherwise the object in view should be to simplify, and not still further to complicate and extend, the already copious list of preparations. It would be of little use to notice every mixture or compound prepared merely for experiment, and having only an ephemeral existence. There are some practitioners who take a delight in ringing the changes on ordinary chemical elements, on the chance of discovering some new mode of combination, having a superiority over the corresponding preparations in common use. Whenever such result is obtained, we take the earliest opportunity of publishing it, but we see no advantage in recording all the failures and theoretical experiments, which have served no purpose but that of gratifying a speculative disposition.

In anticipation of a National Pharmacopœia, which we hope in the course of

a year or two will be in a forward state, under the supervision of the Royal College of Physicians, assisted by the Pharmaceutical Society, we intend to direct attention to the pharmacopœias of the several hospitals, infirmaries, and other similar establishments in the metropolis, and other parts of the kingdom. Each of these institutions has certain conventional formulæ, corresponding with others of a like nature in other institutions, yet all probably differing in some unimportant degree. From the materials which might be thus collected together, and judiciously sifted, it is probable that some useful suggestions might be derived, and that a simplification of the general collection of formulæ might be effected. A remedy which is found to answer the desired purpose in the City of London, is likely to be equally efficacious in the West-end, or in a provincial hospital; and by comparing together the synonymous preparations (or those designed for the same object) in different institutions, a practically useful selection might be made, and the Pharmacopœias more nearly assimilated with each other.

In the compilation of a National Pharmacopœia, recourse should be had to all sources of information from which the result of practical experience could be obtained, and from a large bulk of materials some useful hints might probably be selected. We intend to revert to this subject next month.

PHARMACEUTICAL AND BOTANICAL SOURCES OF INDUSTRY IN INDIA.

The present position and prospects of India afford wide scope for speculative industry and adventure. The extent of the country, the variable capabilities of the soil and climate, and other commercial advantages, have caused our possessions in the East to be a source of wealth of which the limit has never been estimated, and which some persons have supposed to be inexhaustible. The extensive stores of products adapted for use in the arts, manufactures, and medicine, displayed in the Exhibition of 1851, were calculated to excite much interest in the locality capable of yielding spontaneously or with but little expense of cultivation so rich a harvest. Among the products which, from memory, we may briefly enumerate, were a great variety of gums, some of which, from their texture, tenacity, or other qualities, appeared likely to be extremely useful; vegetable wax, opium and senna of different qualities, cotton, flax, and numerous plants yielding an unlimited supply of materials for paper making, with a miscellaneous assortment of medicinal barks, roots, and herbs, including many native medicines, the virtues of which are extolled in their several localities, although but little known or tried in other parts of the world. In this collection the late Dr. Royle took a deep interest, and was indefatigable in the arrangement and examination of the treasures consigned to his charge, a task, however, which proved to be of such magnitude and intricacy, that it was never entirely completed. There still remains to be accomplished a vast amount of research and persevering investigation, in order to develop and bring to maturity the fertile source of wealth which Dr. Royle saw in perspective, and for which he has paved the way.

Subjoined is a valuable notice, quoted from the *Times*, of one branch of inquiry to which the doctor devoted much attention, namely, the cultivation of cotton in India, in which the subject is so well and skilfully handled, that we could not curtail it without destroying its effect. In a former number (vol. xiv., p. 168) we published another article by Dr. Royle, on a variety of materials adapted for the manufacture of paper. This was written at a time when the war with Russia had cut off one of the usual and most extensive sources of supply of such material, and it was the object of Dr. Royle to direct attention to the fact, that in our own possessions we have at command an inexhaustible stock of the substances required, and that consequently we need not be at the mercy

of a foreign power, with whom unfortunately our pacific relations were temporarily disturbed.

Dr. Royle also interested himself in the cultivation of senna, which has of late greatly improved in India, and which is likely to become a still more productive branch of commerce, especially if the continuance or revival of the adulteration of Alexandrian senna should favour the competition.

Another enterprise in which Dr. Royle had for some years been engaged, was the endeavour to introduce into a favourable district of India some of the most valuable varieties of cinchona, for which there is reason to believe that the soil and climate are adapted. This undertaking is one which will require many years for its successful accomplishment, and we hope the decease of the original or principal projector will not interfere materially with the result.

On the cultivation of the poppy, and the manufacture of opium in India, we have already published a very complete account (vol. xi., pp. 205, 269, 306, 359), and our object at the present time is merely to bring forward a few examples as illustrations of the nature and variety of sources of industry, and consequently of wealth, which the British possessions in the East afford.

Recent events in India, although productive of much misery and bloodshed, and attended with most serious apprehensions and anxiety as to the ultimate fate of that country, will, we have some reason to hope and believe, tend to establish on a firmer basis the authority of the British Government, and thus to promote security of property and life, as well as the success of commercial enterprise. Prior to the late revolt, India was in an equivocal position between the British Government and the East India Company—two authorities, having in some respects conflicting and antagonistic interests, and held together by a compact which might be compared to the "honour among thieves," being founded on a similar necessity. The embers of discontent had been smouldering for a considerable time. The British yoke was becoming more irksome and distasteful to certain classes of the native population; the power of the Government was assuming the character of a *theory*, on which a difference of opinion existed; and nothing was wanted but a cry or watchword, as a signal for the general outbreak, which was to subject that theory to the test of physical force. Far-seeing politicians had long anticipated some commotion or struggle; various warnings and suggestions, on the part of persons having local experience, had been disregarded; and although no one denied that the position of affairs was critical and unsatisfactory, it seemed to be the business of nobody to discover or apply a radical remedy for the existing evils. Under these circumstances industry was not likely to be encouraged, or commerce to flourish. When the crisis arrived, the resources of the country were brought to their level; the violence of the commotion exceeded the anticipations of the most desponding observers of passing events; and the result having terminated in favour of the ruling powers, a reaction has taken place in the feelings and prejudices of the native population. The dreadful atrocities perpetrated by the lawless Sepoys have thrown into the shade the comparatively minor evils of a foreign yoke and an unsatisfactory Government; and the preservation of life and the security of property are found to be more substantial advantages than a precarious independence, with the liability to Sepoy barbarity. The progress of events made necessary an adjustment of the anomalous incongruities of power between the British Government and the East India Company, and there is reason to believe that the result will be favourable to the stability of the Government, the security of life and property, the encouragement of industry, and the extension of commerce. With such opportunities in prospect, in a country abounding with pharmaceutical products, and treasures derived from the vegetable kingdom, there is a wide field for the industry of those who combine scientific knowledge with a disposition for commercial speculation.

DR. ROYLE ON COTTON CULTURE IN INDIA.*

The recent death of Dr. Forbes Royle cannot but be regarded as a loss to India. No man living was so well acquainted with the productive resources of our Eastern empire, or so capable of giving advice as to their development in the new epoch which will date from the suppression of the Sepoy revolt. Whatever alteration may take place in the political government of India, there is no doubt that changes are at hand in the industrial and commercial relations of the country. Want of British colonists and of British capital have hindered progress up to this time, but the preliminary work of exploration and inquiry has meanwhile been going on; and among those who have supplied scientific information likely to be turned to good practical account, the first place is due to Dr. Royle. During thirty years' service in the East he filled various important situations; one of which was the superintendence of the Hon. Company's Botanic Garden at Saharunpore. Since his return to England—whether as Professor in King's College, London, or as a director of the Great Exhibition of 1851, or as the author of valuable treatises—he has assiduously laboured to attract attention to the productive resources of India. His latest work, completed shortly before the illness preceding his lamented death, was a review of the measures which have been adopted in India for the improved culture of cotton,—an inquiry of deep interest to the philanthropist and the statesman, as well as to the merchant, manufacturer, and capitalist.

In 1851, Dr. Royle published a more extended work on *The Culture and Commerce of Cotton in India*. These two branches of the subject are in themselves distinct, as much so as was the controversy about the Corn Laws from questions of agricultural improvement in our own country. In treating of Indian cotton culture, the inquiry is simply how to increase and to improve the article produced, whether for local consumption, or for competing in the European market with American produce. But, in considering the commerce in cotton, the subject is complicated by a variety of social and political questions. Dr. Royle's opinions on these will have due weight, and his historical account of the Indian cotton commerce will be useful for reference; but the most valuable part of his work is that which treats of the principles and practice of cotton culture. The *Review* lately published contains an analysis and report of observations and experiments down to the most recent date.

The Indian cotton-plant is a distinct species,—the *Gossypium Indicum* and *G. herbaceum* of different botanists. In geographical range it extends over all regions of India, and grows in the hottest and moistest as well as the driest districts. The varieties arising from soil and climate are all shorter in staple than the American cottons, and in this consists their chief inferiority for the European market. But the Indian cotton has peculiar advantages of its own. Its colour is good; it takes dye well; and yarns spun with it swell in bleaching, thereby giving to the fabrics a closer texture. For strength and durability the natives prefer their own cotton; and the famous muslins of Dacca show how fine the manufactures are of which it is capable. There are several other species indigenous in India, such as the *Gossypium arboreum*; but, though yielding fine cotton, they are not cultivated as a field crop, the produce not repaying the expense of culture. That cotton was spun and woven in the East from the remotest times, we know from its being mentioned in Sanscrit writings twelve hundred years before the Christian era. The discovery of cotton-wool and cotton fabrics in ancient Peruvian tombs proves that America possesses indigenous cotton-plants independent of importation from the Old World; as, indeed, was reported by Columbus, Cortes, and the first European explorers. The *Gossypium Barbadense* of botanists is the species furnishing all the cotton of North America and of the West India Islands; that of Brazil, Peru, and South America generally, is the produce of the *G. Peruvianum*—a species marked by its black seeds, and their adhering firmly together. From North America the *G. Barbadense* was introduced into the Mauritius and the Isle of Bourbon, and thence to India, where the plant has become a permanent variety, and its produce is called Bourbon cotton. The great bulk of the native-grown cotton is produced from the indigenous species, with

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* *Review of the Measures which have been adopted in India for the Improved Culture of Cotton.* By J. Forbes Royle, M.D., F.R.S.

little variation either of culture or of manufacture from what prevailed three thousand years ago. It is only in recent times, since the possibility has been contemplated of the American supply failing the British market, that attention has been fairly directed to India as a cotton-exporting country.

We must refer to Dr. Royle's book for the detailed reports of what has been done in the way of experimental culture. In 1829, the Agricultural Society of India, with the assistance of the Government, made the first systematic attempt to introduce American culture at Akra, near Calcutta. In 1840, a series of experiments on a larger scale was commenced in eight different parts of India by American planters, with American seeds, tools, and cotton-cleaning machines. The results varied, as might be expected, from the variety of soils and climates at the different farms; but the conclusion at which Dr. Royle arrives, from a review of these and of other experimental trials under the most favourable conditions, is, on the whole, not encouraging. The trials have been made in all the Presidencies: in the Punjab, north of Lahore, in the Bundelcund district, in Dacca, and in the Jumno-Gangetic Doab; near Agra, Delhi, Benares; in Scinde, in Oude, and on the coast of Ava. In all these various localities, the reports of the experiments are records of a succession of failures. Sometimes the blame is laid on the soil being too rich, and sometimes on being too poor; the climate of some stations is too moist, and of others too dry; while in a few cases, when good crops have been produced, the ravages of insects have destroyed the hopes of the cultivators. It is true that results of a more promising kind have been obtained in Tinnevelly, Guzerat, and some other districts; but the general unsuitableness of the Indian climate for the American species of cotton-plant is established by the vast majority of the experiments. The reason of this unsuitableness is clearly explained in Dr. Royle's remarks on the irrigation of crops in dry soils otherwise favourable:—

"The great difficulty in applying irrigation to cotton in India, is, that you have to deal with a plant which has been raised in the rainy season, and which necessarily has all the habits of one accustomed to moisture both of soil and climate. And yet it is one of which you must check the luxuriant growth if you wish to have a sufficient production of flowers and fruit. This is done naturally in most plants by the heat and dryness of summer, and in Egypt, where cotton is copiously irrigated, by the dryness of the climate. But in cultivating American cotton in India, you have a moist-weather plant—that is, one with short roots and broad leaves, exposed suddenly to dryness, when, from the clearness of the sky, and the heat of the sun, there must necessarily be copious evaporation. The Indian species which is a moisture-and-drought-enduring plant, withstands both the suddenness and the violence of the changes; but then it only produces a short-stapled, woolly cotton."

Whatever, therefore, may be the result of judicious culture in special localities, the prospects of obtaining a large supply of American cotton of Indian growth are very doubtful. But it is certain that native Indian cotton might be obtained of a quality and at a price to compete with a large proportion of the American cotton. Though short in staple, and not easily spun by machines suited to American cotton, the natives contrive to spin it into the finest yarns. In strength, durability, and other good qualities, it is well adapted for at least one-half of the manufactures in this country—that is, for all yarns under No. 20. Indian cotton of this quality could always be sold with profit in Liverpool at $3\frac{3}{4}d.$ a pound. The cost of production and of carriage is not the hindrance to a large and regular supply. But the uncertainty of price in the English market, determined by that of American cotton, prevents the steady increase of Indian culture and commerce. When the difference between the two cottons is $\frac{3}{4}d.$ or $1d.$ a pound, the spinners of No. 20 yarn will give the larger sum for American cotton, on account of the waste from the inferior condition of the Indian cotton. It is to the improvement of the quality and state of the Indian cotton that attention ought to be first of all directed. Since it can now be sold for a profit in Liverpool, at $3\frac{3}{4}d.$ a pound, there is a wide margin for improving the quality so as to secure a demand in the market. It must be admitted that little can be done at present towards improved culture. This can only be effected by the slow influence of European or American overseers superintending the ryots, and by the stimulus of a higher price offered for a better article. But there are other causes which depress the value of Indian cotton in the market. It is carelessly collected, carelessly cleaned, carelessly housed, and carelessly packed. The mid-

dlèmen who buy it from the ryots, fraudulently adulterate it to such a degree that one-fourth of the fair price is the usual deduction of a purchaser for estimated impurities. The ryots, naturally indolent, prefer the tolerably certain return for inferior and dirty cotton to the trouble and expense involved in having a cleaner cotton ready for the agents when they come round to purchase.

The carelessness of the cultivators and the fraud of the agents will not be diminished till European colonization is increased, but meanwhile a great step might be taken by the merchants at the Presidencies examining the cotton (as the Government does the opium), regulating the price by the quality, and refusing such produce as degrades Indian cotton in the home market. That good and clean cotton can be obtained by those who deal directly with the producers is evident by the East India Company's Thomil cotton in former times being of this nature, agents sending dirty cotton not being paid their commission. The Dharwar and Candeish cotton, bought up and cleaned in recent experiments sold well, and we have the testimony of Mr. Turner and Messrs. Clarke in this country, and of Mr. Landon in India, that Surat cotton when brought to market in a clean state, is fit for spinning No. 40 yarns. The most effective and cheapest way of securing general improvement would, therefore, appear to be in the first instance for Chambers of Commerce or manufacturers to establish agencies at the places of export, whose firm dealing with the native agents would compel the supply of a cleaner cotton. When English planters multiply and English machinery is at work in the interior, there will be little difficulty in increasing the produce, and sending it to market in a state fit to compete with ordinary American Uplands cotton. Until the cotton can be cleaned and prepared on the spot, for transmission by the river and rail conveyance that will hereafter open up Indian commerce, the main hope of improvement must rest on the interference by European agents with the wakarias, chettys, and other middlemen, whose exactions and frauds have disgraced this branch of Indian commerce. The general results of Dr. Royle's inquiries may be thus briefly stated:—First, the climate of India is, on the whole, unsuitable to the successful culture of the American species of cotton-plant; secondly, the native Indian cotton may be brought to the English market at a price and in a condition to supply regularly half the demand of the manufacturers; thirdly, the hindrances to the increase of profitable Indian cotton commerce arise chiefly from the demand and price being dependent on the greater or smaller crops of America, the manufacturer never using Indian cotton when they can get American cotton cheap; fourthly, by arranging for the purchase of the produce directly from the cultivators, or by establishing agencies at the places of export to control the native middlemen, the Indian cotton might be obtained in a condition that would secure for it a better reputation and price than it now commands,—local agencies would be, of course, preferable, as likely to obtain for the cultivators a share of the benefit now intercepted by the extortionate middlemen; fifthly, with increased security to property under a firm Government, and with improved cultivation, superintendence, machinery, and modes of conveyance, the quantity and quality of Indian cotton may be made such as to render its regular and remunerative commerce quite independent of the crops of other countries. Thus, by the ordinary course of commercial enterprise, there will never be occasion for having recourse to "protection" by imposing a duty on cotton from other than British possessions—an expedient which Dr. Royle justly describes as admissible only as a last resort for encouraging Indian culture and commerce. — *Times*, March 11th.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

FINANCIAL STATEMENT—*From January 1st to December 31st, 1857.*

RECEIPTS.	£	s.	d.
Balance in Treasurer's Hands	504	16	0
Balance in Secretary's Hands	107	2	1
Life Members' Fund:			
14 Life Members' Fees ... 123 18 0			
Interest ... 37 17 5	161	15	5
Benevolent Fund:			
Subscriptions ... 51 3 0			
Interest ... 137 2 6	188	5	6
Government Securities, Interest	195	15	11
Fees:			
32 Pharmaceutical Chemists	184	16	0
37 Assistants ... 161 14 0			
80 Apprentices ... 168 0 0	514	10	0
Subscriptions:			
400 London Members' ... 419 9 6			
1726 Country Members ... 1807 1 0			
235 Associates ... 123 7 6			
143 Apprentices ... 75 1 6	2424	19	6
Arrears of Subscriptions	57	15	6
Lecture Fees	34	13	0
Sale of Journals	1	13	0
Sundries (repaid)	1	17	6
Balance of Petty Cash due to Secretary	8	0	10½
	£4201	4	3½

EXPENDITURE.	£	s.	d.
Benevolent Fund:			
Investment ... 208 7 3			
Gratuities ... 30 0 0	238	7	3
Invested in Government Securities	928	15	
Conversazione ... 54 11 3			
Pharmaceutical Meetings 15 1 6½			
J. T. Cooper, Accountant 5 8 0			
Repayments ... 13 11 0	88	11	9½
House Expenses	22	2	2
Rent, Rates, and Taxes	364	6	1
Repairs	30	2	9
Fixtures and Fittings	15	10	6
Apparatus	0	12	0
Museum	31	15	11
Postage (including £18 8s. 6d., Questions on Sale of Poisons Bill)	66	5	9
Stationery	11	0	5
Advertisements	8	4	6
Printing and Engraving	56	10	4
Collector's Commission	40	17	9
Board of Examiners	67	4	0
Expenses of Society in Scotland	52	16	8
Travelling, Country Members	76	9	10
Salaries	300	0	0
Wages	211	2	0
Pension, late Secretary	75	0	0
Gratuities	15	0	0
Journals	561	13	2
Do. Delivery and Postage	184	12	6
Library	13	8	0
Carriage	1	3	2
Professor of Chemistry and Pharmacy, including duties as Curator in his department, and payment of Assistant	300	0	0
Professor of Materia Medica and Botany, including duties as Curator in his department, and payment of Assistant	250	0	0
Subscription to Royal Botanical Gardens	21	0	0
Prize Medals	3	7	0
Repayment to Secretary, due 31st Dec., 1856 ... 2 9 10			
Plus ... 0 2 8	2	12	6
Balance in Treasurer's hands	162	13	3
	£4201	4	3½

We, the undersigned Auditors, have examined the Accounts of the Pharmaceutical Society, and find them correct agreeably with the foregoing statement, and that as shown by the Books of the Society there was standing in the names of the Trustees of the Society, at the Bank of England, on the 31st of December, 1857:

	£	s.	d.
On Account of the General Fund, New 3 per Cents.	7345	4	8
Benevolent Fund, 3 per Cent. Consols	5036	16	6
Life Members' Fund, 3 per Cent. Consols	1325	18	7

GEORGE L. PEDLER,
WILLIAM BOWER,
JOHN CARR,
ARTHUR BOWDLER HILL,
ADOLPHUS FREDERICK HASELDEN,
} Auditors.

February 10th, 1858.

AT A MEETING OF COUNCIL, *March 3rd*, 1858,

Present—Messrs. Ballard, Bell, Bird, Brew, Deane, George Edwards, Hanbury Keeling, Moore, Morson, Peacock, Squire, and Waugh, the following were elected

MEMBERS.

BIRMINGHAM .....Johnson, George
CAMBRIDGE.....Knight, John
CHATTERIS .....Langman, Peter
MANSFIELD.....Patterson, Douglas John

MAJOR EXAMINATION, *March 16th.*

Berger, Volcy.....Clapham
Icke, Henry Scott .....London
Tiplady, Frederick .....York

MINOR EXAMINATION.

Baschet, Edmond .....Mauritius
Boullé, Janvier Alfred .....Mauritius
Dunhill, William Workman... .....Doncaster
Minet, Edouard Alphonse .....Mauritius
Nicholson, John Joseph .....Sunderland

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	ADDRESS.
Bradley, John Perry	Mr. Parkes	Birmingham
Davenport, John Metcalf	Mr. Davenport	London
Davies, William	Mr. Coleman	Cardiff
Eastman, Jabez	Mr. Clark	Hackney
Hartley, William	Mr. Humphreys	Birmingham
Phillips, Jonathan	Mr. Christian	Godalming
Pissey, William Ferdinand	Mr. Pissey	Rayleigh
Pratt, Henry	Mr. Loggin	Stratford-on-Avon
Romans, Thomas	Mr. Cutting	Selby
Waters, Alexander	Mr. Corrie	Bedford

Mr. Standring, of Manchester, was appointed a Member of the Council for the remaining portion of the year, in lieu of the late Mr. James Woolley.

EXAMINATION FOR FREE ADMISSIONS TO THE ROYAL BOTANIC GARDENS.

THE Secretary of the Royal Botanic Society, at the request of Mr. Bentley, placed at his disposal twelve free admissions to the Gardens in Regent's Park. Mr. Bentley has awarded them to the following students, who passed the best examination in Structural Botany:—

Messrs. George Bennett, Clement Dallas, James Dunn, Thomas H. Francis, James Green, William C. Holmes, Frederick Nicholson, John J. Nicholson, E. J. Owles, William Partridge, John Robert Thompson, John Twinberrow.

The orders are available for six months, and admit the bearer from 7 o'clock in the morning till 1 P.M., during the months of May, June, and July; and from 9 A.M. to 1 P.M. in the months of March, April, and August.

PHARMACEUTICAL MEETING,

Wednesday, March 3rd, 1858,

MR. BIRD, VICE-PRESIDENT, IN THE CHAIR.

THE following donations were announced:—

Journal of the Photographic Society, from the Society.
Journal of the Society of Arts, from the Society.
Journal of the Proceedings of the Linnean Society, from the Society.
Report on the Mortality in the British Army.

AFRICAN SENNA.

Mr. Bentley exhibited to the meeting a sample of senna from Africa, which had been given to him by Dr. Livingstone, the celebrated African traveller. He thought that such a specimen was at the present time of much interest, as an expedition was about to start for the exploration of the Zambesi river, with a view of ascertaining the nature of the vegetable and mineral productions of the countries which were traversed by it; and as senna grew in great abundance in these regions, they might become one of the principal sources of our supply of that important drug. This senna resembled in its characters that of ordinary East Indian, and was therefore, no doubt, derived from the same or a nearly allied species of *Cassia*. Mr. Bentley thought it was of great advantage to be able to obtain our supplies of senna from several districts, as, by so doing, we prevented in a great measure its extensive adulteration at any particular one, as was formerly the case, especially with Alexandrian senna. He said that the latter kind of senna had much improved of late years, but it was still, at times, much adulterated. The improvement which had taken place was entirely due to the exposure of its systematic adulteration some years since by the Pharmaceutical Society, and this example might be mentioned as one of the many successful results of the Society's operations in checking the adulteration of drugs.

Mr. Bentley also exhibited a specimen of cotton of good quality, which had been also brought from Africa by Dr. Livingstone. He said that as the prosperity of England was in a great measure attributable to our cotton manufactures, and as there was always a fear of the supply not being equal to the demand, it was very important for our manufacturers to know that many parts of Africa were well adapted for the cultivation of the cotton plant.

Mr. Bentley also exhibited a specimen of a plant from Africa, which yielded very strong fibres, and at the same time placed upon the table some samples of the fibre in a raw state, as well as string and rope of great strength manufactured from it. Mr. Bentley said that Dr. Livingstone had informed him that this fibre might be obtained to almost any amount in Africa. He hoped that the expedition now about to sail would have the result of making us acquainted with many new vegetable substances, useful in medicine, manufactures, the arts, and domestic economy. Although it would not be wise to be too sanguine, as the difficulties of exploring a new country were always of a very formidable character.

NOTE ON A DRUG CALLED *ROYAL SALEP*.

BY DANIEL HANBURY.

Among some specimens of Materia Medica from Bombay, for which I am indebted to the kindness of the late Dr. J. E. Stocks, is one which was received under the designation of *Badshah Saleb* or *King Salep*. The specimen being a solitary one, and no information respecting it, beyond that conveyed by its name, having reached me, it remained almost unnoticed until within the last few months, when an original package, containing about 100 lbs. of an unknown and un-named drug from Bombay, was offered for sale in the London market. Upon seeing samples of this drug, I recognized it as *Badshah Saleb;* and having obtained from this source a more abundant supply, I have been able to some extent to investigate it, and the results of that investigation I will now detail.

In the first place the name *Badshah Saleb* بادشہ ثعلب is partly Persian and partly Arabic,—*Badshah* being the Persian for *King*, and *Saleb* the Arabic original of our word *Salep*. The term may therefore be rendered *King Salep* or *Royal Salep;* and it has doubtless been applied on account of the drug being regarded as Salep of pre-eminently large size. That it is in reality very

distinct from true Salep—in fact, that it is not a *tuber*, but a *bulb*, was pointed out to me by my friend Dr. Lindley, who has further suggested its botanical origin. I will however first describe the drug as met with in commerce.

Fig. 1. Fig. 2.

Royal Salep,—natural size.

Royal Salep consists of dried bulbs (fig. 1, 2), whose dimensions from base to apex vary from $1\frac{1}{4}$ to 2 inches. The largest specimen weighs 730 grains: the average weight, taking twenty bulbs, was found to be 337 grains. Allowing for considerable irregularity occasioned by drying, the form of the dried bulbs may be described as usually nearly spherical, sometimes ovoid or even oblong, always pointed at the upper extremity, and having at the lower either a depressed cicatrix, or frequently a large, white, elevated, scar-like mark. Their surface is striated longitudinally, besides which there is mostly one broad and deep furrow running in the same direction. They are usually translucent, transmitted light showing them to be of an orange-brown; by reflected light they are seen to vary from a yellowish brown to a deep purplish hue—sometimes shaded at the base into an opaque yellowish white.

In substance the bulbs are dense and horny: they may be cut with a knife, but can hardly be powdered. After several hours' maceration in water, they become soft, opaque, and of a slaty or purplish hue, and increase greatly in volume, regaining in fact their natural size and form (see fig. 3). If in this state a bulb be cut longitudinally into two equal portions, its distinctness from an orchis tuber will be at once manifest. Instead of the homogeneous, fleshy mass of the latter, we find a single fleshy envelope or scale of excessive thickness, whose edges overlap each other; this scale surrounding an elongated, flattened bud (fig. 4).

Although this single convolute scale is all that remains in the dried bulb, it is supposed by Dr. Lindley that other scales external to it have been stripped off previous to drying.

Of the plant affording *Royal Salep*, and of its place of growth, nothing appears to be known. I have not been able to discover any notice of the drug in the works of Kæmpfer, Forskål, Ainslie, Roxburgh, Royle, or O'Shaughnessy. Honigberger, in speaking of the sorts of Salep used at Lahore, mentions one resembling a dried fig, which I suppose may be the drug under notice, but he gives no account of it. Dr. Lindley's examination of the bulb leads him to the opinion that it is possibly that of some species of Tulip, of which there are four known to occur in Affghanistan. *Tulipa Oculus-solis* (St. Amans) and some other species, when grown in favourable localities, certainly produce very large bulbs, which have moreover but few scales; but I am ignorant of any having a

scale of such enormous thickness as that seen in the drug under notice. It is obvious, however, that the question of botanical origin cannot be determined from our limited materials.

Upon the uses of *Badshah Saleb*, I can say very little: from the bulb being mucilaginous and saccharine, I presume it may answer some of the purposes for which orchideous tubers are valued. At the same time it has a bitterish and slightly acrid taste, that quite unfits it as a substitute for Salep in this country. The decoction of *Badshah Saleb* is far less mucilaginous than that of true Salep: it is not rendered blue by the addition of a solution of iodine.

FIG. 3.

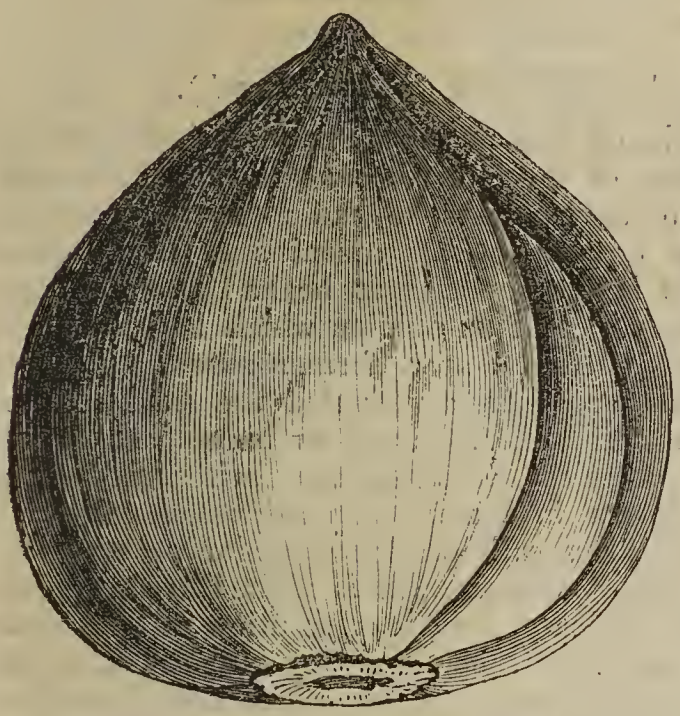
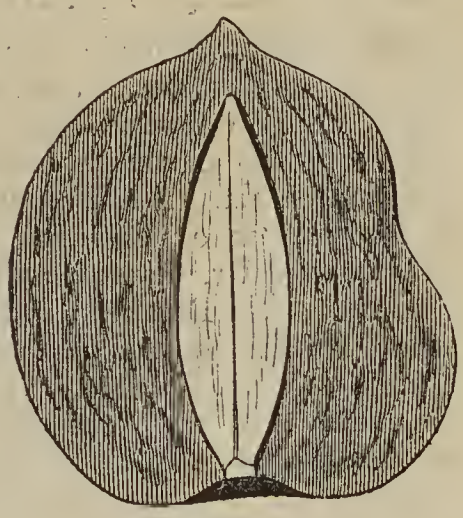


FIG. 4.



Royal Salep—FIG. 3, the bulb, fig. 1, after maceration in water. FIG. 4, longitudinal section of a bulb after maceration.

Mr. Bentley said that the bulbs now described by Mr. Hanbury under the name of "Royal Salep," closely resembled some that were imported a few years since, mixed with sumbul root. The latter had the same general appearance externally, and contained in their interior a central bud, which was enveloped by a solitary fleshy scale of great thickness. The chief distinction between the bulbs was apparently in the odour of the two respectively, for those which were mixed with sumbul were strongly alliaceous, while in the royal salep bulbs no such odour could be distinctly traced, although he thought there was some faint evidence of such an odour. He thought it probable, therefore, that the royal salep would prove to be the bulb of a species of *Allium*, rather than that of a *Tulipa*. Mr. Bentley said that the bulbs by keeping, had lost the translucency and yellowish-brown colour which they had at first possessed, and become opaque, and of a much darker hue.

GLYCERINA CUM FERRI IODIDO.

BY MR. A. F. HASELDEN.

AN inquiry having been made, by a correspondent in the *Pharmaceutical Journal*, for a formula for the above-named preparation, I beg to suggest the following:—

Take of	Iodine	℥iv.
	Iron Wire, clean and cut into pieces	℥ij.
	Distilled Water	℥iv.

To the iodine and iron, in a bottle, add the water; secure with cork or stopper;

place the bottle horizontally, and agitate by shaking frequently, until the solution becomes colourless, or nearly so, which will be the case in about forty-eight hours; filter the solution through lint; and add thereto sufficient pure, colourless, anhydrous glycerine of density 1265, to measure accurately seven fluid ounces.

This preparation will be found identical in strength with the Syrupus Ferri Iodidi of the Ph. Lond., but it is doubtful whether it possesses any advantages over it: from my own observation, I find that it does not remain unchanged so long.

18, *Conduit Street*, *2nd March*, 1858.

LIQUOR POTASSÆ ARSENITIS (*Pharm. Lond.*).

Mr. Redwood made some remarks on this preparation, referring especially to a communication in the last number of the *Pharmaceutical Journal*, in which Mr. Bamber described the results of experiments he had made to determine what changes occur in making the liquor potassæ arsenitis of the London Pharmacopœia. Mr. Bamber stated in his paper, that he had been induced to make these experiments in consequence of an opinion which had been expressed by Dr. Garrod and himself (Mr. R.) at a former meeting of that Society. Mr. Bamber, however, had not correctly quoted the statement on which he commented. It was not stated by Dr. Garrod or himself, as represented by Mr. Bamber, "that no chemical decomposition arises on boiling arsenious acid with carbonate of potash in making liquor potassæ arsenitis of the Pharmacopœia." What had been said on the occasion referred to amounted to this, that the so-called *liquor potassæ arsenitis* of the Pharmacopœia is not what its name would appear to indicate, but is a solution of arsenious acid in carbonate of potash. This statement, he (Mr. R.) considered to be quite correct as a representation, in general terms, of the preparation alluded to. There was nothing new in the opinion so expressed. The same statement had been published many years ago by Professor Soubeiran, and more recently attention had been directed to the circumstance by Mr. Bullock and others. The statement referred to the preparation made according to the process of the Pharmacopœia, in which eighty grains of arsenious acid and the same quantity of carbonate of potash are ordered to be boiled with half a pint of distilled water, until they are dissolved, and then five fluid drachms of compound tincture of lavender, and as much more water as will make the whole up to twenty fluid ounces, are to be added. The question was simply whether in this process the arsenious acid decomposed its equivalent of carbonate of potash, so as to form an arsenite of potash; or whether it was merely dissolved in the solution of carbonate of potash. To determine this point, Mr. Bamber had first boiled a solution of carbonate of potash with excess of arsenious acid, evaporated the solution to dryness, and examined the dry residue, which he found to consist principally of arsenite of potash. He observed also that during the boiling carbonic acid was given off. These results having been sent for insertion in the *Pharmaceutical Journal*, to prove the incorrectness of the statements which had been published in the May number of that journal, the communication was not published, but a notice was inserted, to the effect that the experiments described were insufficient to determine the question, as the directions of the Pharmacopœia had not been followed. (See *Pharm. Journ.* for January and February, 1858, pages 391 and 439.) Since then Mr. Bamber had made another experiment, and being anxious for the insertion of his results, they were published in the last number of the Journal. The tendency of Mr. Bamber's communication being to indicate that on making liquor potassæ arsenitis according to the Pharmacopœia, the arsenious acid decomposes its equivalent of carbonate of potash,

forming an arsenite of potash, which, with the excess of carbonate of potash ordered in the process, is contained in the solution when finished; and this representation being, as he (Mr. R.) conceived, very erroneous, it was desirable that it should not be circulated among the readers of the *Pharmaceutical Journal* without some further explanation of the facts of the case. There was a marked deviation from the directions of the Pharmacopœia in all Mr. Bamber's experiments, even in that last described by him. It might be observed with reference to this experiment, that the substitution of five grammes for eighty grains, while it involved an error in quantity, could not in any way make the experiment more trustworthy. Then the boiling from ten ounces down to six ounces was irreconcilable with the directions of the Pharmacopœia, which *could* only admit of evaporation to the extent of five drachms, and practically did not involve evaporation to the extent of even one drachm. Moreover, the calculations of the per-centages of carbonic acid were all incorrect, according to the data given, assuming that the ingredients used were such as the Pharmacopœia ordered. Mr. Bamber appeared to have entered upon the investigation of the subject with a preconceived notion that arsenious acid ought readily to decompose carbonate of potash, and finding that carbonic acid was given off during the boiling of the solution, he concluded that the decomposition was complete. It might be worth while to occupy a few minutes of the time of the meeting in explaining what really occurs under the circumstances which had been referred to. On mixing arsenious acid and carbonate of potash in solution, there was no evolution of carbonic acid at any temperature up to the boiling point of the liquid. Large quantities of arsenious acid could be dissolved in solution of carbonate of potash, aiding the solution by the application of heat, and not a trace of carbonic acid was given off. When such a solution was boiled, there was still no visible evidence of decomposition afforded by effervescence, such as occurred when acids capable of decomposing the carbonate were used. During the continuance of ebullition, however, small quantities of carbonic acid passed off with the vapour of water, the bubbles of steam as they passed through the liquid forming atmospheres into which the carbonic acid diffused, and thus the tendency to diffusion caused a slow decomposition of the carbonate that would not otherwise occur. Long-continued boiling was thus necessary to effect the decomposition of any notable amount of carbonate of potash. If the arsenious acid and carbonate of potash be used in equivalent quantities (66.66 grains of carbonate of potash, P.L., to 80 grains of arsenious acid) after many hours' boiling, much of the carbonate would still be found undecomposed. The same slow action took place even when two equivalents of acid were added to one of carbonate. When the quantities of ingredients were such as those ordered in the Pharmacopœia, as the arsenious acid readily dissolves in solution of carbonate of potash, the solution would be complete before the temperature of the liquor had reached the boiling point, and therefore no continued boiling was required, and no appreciable amount of decomposition of the carbonate of potash would take place, or, at any rate, not such as to affect the general character of the product, which would be essentially a solution of arsenious acid in carbonate of potash. The small and variable quantity of carbonic acid which would escape during the act of ebullition, the solution could recover again from the air, for at common temperatures carbonic acid was capable of decomposing arsenite of potash and setting the arsenious acid free. If Mr. Bamber had formed his estimate of the properties of arsenious acid by studying the effect of passing carbonic acid through a strong solution of arsenite of potash, he would not probably have been surprised to find it asserted that arsenious acid, under certain circumstances, failed to displace carbonic acid from its combinations. In several respects arsenious acid gave evidence of its being a weak acid. When combined with the alkalies the products were almost as alkaline in their reactions upon test paper as would be the case if the acid were not present at all. Even

the binarsenite of potash was strongly alkaline. In fact, arsenious acid was described as being capable, under certain conditions, of playing the part of a base rather than an acid. Arsenic was isomorphous with antimony, and the compound of these two metals had many points of resemblance. Thus, oxide of antimony (SbO_3) was capable of combining with potash, forming a compound in which the oxide of antimony played the part of an acid, while on the other hand it could combine with tartaric acid, forming a compound in which it played the part of a base. So in like manner, arsenious acid, or oxide of arsenic as it used to be called (AsO_3), could either combine with a base or with an acid. When added to cream of tartar it formed a compound resembling emetic tartar in constitution, AsO_3 taking the place of SbO_3.

Mr. Bamber said the construction he had put upon the observations made by Dr. Garrod and Mr. Redwood, as reported in the *Pharmaceutical Journal*, was, that the liquor potassæ arsenitis of the Pharmacopœia was a solution of arsenious acid in carbonate of potash, and nothing else. Having found from his experiments that carbonic acid was given off during the boiling, he considered that statement erroneous. He had not found in his experiments that the whole of the arsenious acid was dissolved before the solution reached the boiling point.

Mr. Attfield remarked, that when arsenious acid was fused with carbonate of potash, decomposition of the latter took place, accompanied with a copious effervescence.

Mr. Porrett referred to instances in which carbonic acid was not displaced by other acids usually considered to be much stronger in their affinities. Thus, hydrochloric acid would not decompose carbonate of lime when placed under pressure. He thought it had been clearly proved that arsenious acid was incapable of decomposing carbonate of potash in solution at any temperature up to the boiling point of the liquid, and that even during the act of ebullition the decomposition was very slow, and at last but imperfect.

NORTH BRITISH BRANCH.

NEW REMEDIES.

At the Annual Meeting of the Members of the Pharmaceutical Society, held in Aberdeen on 12th March, it was unanimously resolved to direct the Secretary to communicate to the President of the Pharmaceutical Society in London, the desirableness of having a description of the new remedies with the doses, and, if possible, the mode of preparation, given in the *Pharmaceutical Journal* as soon as they are introduced into medical practice, as it has been felt, that hitherto, before any notice of them had been given in it, Medical Men had been furnished with particulars regarding them in the *Lancet*, *Medical Times*, and other publications, and frequently prescribed them before they had been heard of by the Chemists. It is therefore hoped that the recommendation may meet with the attention of the Society.

Extracted from the Minute Book by

Aberdeen, March 17th, 1858. Charles David Low, *Secretary.*

PHYTOLOGICAL SOCIETY.

Wednesday, Feb. 10th, 1858.

DANIEL HANBURY, F.L.S., IN THE CHAIR.

A paper was read by Mr. H. Groves, "On the Flora of Portland," and illustrated by specimens.

Wednesday, March 10th, 1858.

ROBERT BENTLEY, F.L.S., PRESIDENT, IN THE CHAIR.

The following paper was read:

REMARKS ON THE UMBELLATE DEVELOPMENT OF SCABIOSA SUCCISA.

BY MR. HENRY GROVES.

In the description of the abnormal development of *Scabiosa succisa*, given in the *Pharmaceutical Journal* for January, the umbelliform arrangement of the flowers is supposed to infer an affinity of *Dipsacaceæ* to *Umbelliferæ*. On consideration, however, I should be more inclined to suppose that the affinity lies not so much with the two orders as with their two modes of inflorescence. An analysis of the respective families would not lead one to infer any relationship, the structure of fruit, &c., being so diverse; but on comparison, the forms of floral arrangement have a considerable degree of identity.

The alliance between an umbel and the glomerule is readily admitted, but I think we should not lose sight of the fact that the last-mentioned mode of inflorescence bears a great resemblance to the capitulum, so that in fact it is but a connecting link between two forms, which at first sight present no remarkable degree of similarity. We shall now endeavour to trace the gradual development of the capitulate to the umbellate form. In *Umbelliferæ* there are many genera in which the florets are so arranged as to form a close resemblance to a capitulum; we may instance *Eryngium*, where the involucre is composed of a few large, closely-applied bracts, enclosing a number of florets, which, although not developed on an umbel, present the usual characteristic ordinal features in as great a degree as any member of the family. In *Astrantia* we have another somewhat similar form; approaching a glomerule, in that the individual florets are pedicellate; but with the involucre even more highly developed than in the first-mentioned genus. The same may be said of some species of *Bupleurum*, and may be well seen in our familiar British species, "*tenuissinum*." There are not wanting other capitulate orders in which the sub-umbellate character is represented by the frequent occurrence of the glomerule; thus, *Plumbaginaceæ*, and more especially *Dipsacaceæ*, present many genera, the inflorescence of which is of that nature. In *Compositæ* there are species in which the florets are pedicellate, and consequently in the first stage of a simple umbellate development. It is scarcely to be wondered at, therefore, that some genera under peculiar circumstances, taking place at a certain period of their growth, should occasionally luxuriate in a higher organization; indeed, it is surprising, that no other instance than the one lately chronicled should have been noted.

There are other points of resemblance between the forms under consideration which especially demand our attention. In the first place one cannot fail to mark the general tendency which even the highly organized forms of *Umbelliferæ* have to develop a ray, and there are few genera where this tendency fails to be traced in a remarkable manner in the outer row of florets. Moreover, it frequently occurs that these "ligulate" flowers are abortive, as is especially noticeable in the genus *Œnanthe*, a circumstance which frequently happens in the florets of the ray in many *Compositæ*. May not also the paleæ, or bractlets, found in many composites, as *Anthemis*, bear a relation to the partial involucre of umbellifers? If we regard the involucres of the last-named order to be a whorl of bracts, in the axils of which the florets are developed, the resemblance will be still more apparent. It must not be imagined, that in the foregoing remarks, a comparison is drawn between the capitulum and umbels of every kind, as the observations would not be applicable to those forms to be met with in such families as *Primulaceæ*, which perhaps bear a greater resemblance to the corymb than to the form under consideration. Finally, it will be well for botanists to look not only for the development of capitulate forms into umbels, but also to observe whether, under peculiar circumstances, the latter form may not occasionally be found to approach the capitulum.

Mr. Bentley said that he was very glad to find an old pupil directing his attention with so much success to botanical pursuits as Mr. Groves, as he had already forwarded several interesting papers to the Phytological Society. He hoped that so

good an example would be followed by many others. He said that the paper which had just been read, presented many points worthy of discussion. He thought, however, that the arguments brought forward by the author, instead of disproving the affinity between the *Dipsacaceæ* and *Umbelliferæ*, rather tended to establish their relation. In the specimen exhibiting an umbellate development of the inflorescence of *Scabiosa succisa*, which he had described in the January number of the *Pharmaceutical Journal*, and which had led to the present paper, he had mentioned that this umbellate arrangement was an indication of affinity between the *Dipsacaceæ* and *Umbelliferæ*. He did not mean by that expression, that the similarity in the mode of inflorescence was by itself any strong mark of affinity, but only an additional indication of affinity between the two orders, which had not been previously noticed; for, in many respects, these orders presented a certain relationship. Thus, the *Dipsacaceæ* resembled the *Umbelliferæ* in their adherent calyx and the little development of its limb; in their inferior ovary; in their pendulous ovules; albuminous seeds, and commonly involucrate flowers. The involucel also, which surrounded each flower in the head of a Dipsacaceus plant, must be regarded as bearing the same relation to each of those flowers, as the partial involucre of Umbellifers did to each umbellule. The *Dipsacaceæ* were no doubt far more nearly allied to *Valerianaceæ* and *Compositæ* than to *Umbelliferæ*, but their relationship, to a certain extent, was at once proved by the above-mentioned points of resemblance between the two orders.

Mr. Bentley said that the author was altogether in error when he spoke of the alliance between an *umbel* and a *glomerule;* for there was no affinity whatever between those two kinds of inflorescence, as they belonged to distinct forms of inflorescence. Thus, the umbel was an indefinite form of inflorescence, and accordingly opened its flowers in a centripetal manner; while the glomerule was a definite form of inflorescence, and expanded in a centrifugal manner. If we substitute, however, capitulum for glomerule, then we have a near relationship; for the umbel and capitulum are both kinds of indefinite inflorescence, the chief distinction between them consisting in the fact, that in the capitulum the flowers are sessile on the receptacle, while in the umbel they are stalked.

Mr. Bentley remarked that the examples brought forward by the author proved how necessary it was to look to the structure of the fruit in the diagnosis of the order *Umbelliferæ*, this being by far the best distinctive character of the order; for the umbellate character was frequently imperfect, and in some cases even replaced by racemes and panicles.

EXTRAORDINARY DEVELOPMENT OF A PARSNIP ROOT.

Mr. Bentley exhibited a specimen of a Parsnip Root, which had been forwarded to the Society by Mr. Baijent, of Shefford, in Bedfordshire. The root, when received, measured 3 feet 7 inches in length; and even then the entire root had not been got out of the ground, as it bore marks at its lower extremity of having been broken off. Hence, when whole, it could not have been less than between five and six feet in length. He said that this root presented a marked illustration of the depth to which roots would descend into the earth, if they grew in a soft medium. He did not know the nature of the soil in the present case, but he had no doubt but that it was of a sandy character. Mr. Bentley remarked that we were too much in the habit of looking upon the stem and its divisions as constituting nearly the whole growth of the plant, whereas it frequently happened that the root developed as much or more below the surface of the ground as the stem did above it; and the specimen now exhibited was an interesting illustration of such a development.

MONSTROSITY OF THE COMMON ORANGE.

Mr. Bentley also exhibited a specimen of the fruit of the common Orange, which had been forwarded to him by Mr. Brown, a former pupil in the Class of Botany. This fruit had become monstrous by the multiplication of its carpels, and presented the curious appearance of a number of little oranges included within a larger one.

The next meeting of the Society, to be held on April the 14th, will be a General Meeting, to receive the following Rules, which the Committee propose to substitute for those at present in force.

Rule I.—The management of the Society shall devolve upon a Committee, consisting of a President, any number of Vice-Presidents not exceeding six, a Treasurer, a Secretary, two Curators, and six other members. Three to be a quorum. The Committee shall fill up vacancies that may occur in its number.

Rule II.—Every Candidate for admission into the Society shall be proposed by a Member at an Ordinary Meeting, and, after an interval of not less than one month, shall be balloted for. A majority of votes to decide. After he has been elected, he shall sign the following obligation, to be kept by the Secretary, and pay an entrance-fee of 2*s.* 6*d.* and his subscription, upon which he shall be admitted a Member of the Society.

Obligation.

I, A——— B———, having been elected a Member of the Phytological Society, do hereby engage to promote the interests of the said Society and abide by its rules, so long as I continue a Member thereof.

Rule III.—The subscription shall be 2*s.* 6*d.* per annum, payable in advance.

Rule IV.—In the case of Members who shall be elected after the month of October, and who shall have paid their entrance-fee and subscription, such subscription shall count for the year next ensuing.

Rule V.—Botanists who may not belong to the Pharmaceutical body, but whose co-operation would be valuable to the Society, shall be eligible as Members.

Rule VI.—Any Member desiring to withdraw from the Society, shall signify the same in writing to the Secretary. Any Member whose subscription is in arrear for three years, may be removed by the Committee from the list of Members.

Rule VII.—A meeting of Members shall be summoned annually, in the month of January, to receive the Report of the Committee, and the Treasurer's accounts, and to elect officers for the ensuing year. The election shall be by ballot. Members of the late Committee shall be eligible for re-election.

Rule VIII.—At the Ordinary Meeting in the month of December, two Members not belonging to the Committee shall be appointed Auditors to examine the Treasurer's account for the Annual Meeting.

Rule IX.—The foregoing Rules shall not be altered without the consent of a General Meeting of the Members. The Committee may, however, make such Minutes for carrying out the objects of the Society as may, from time to time, be found necessary.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The tenth meeting of the session was held in the Royal Institution, Colquitt Street, February 25th,

H. S. EVANS, ESQ., THE PRESIDENT, IN THE CHAIR.

Mr. Hingston was elected a member of the Association, on the proposition of Dr. Edwards, seconded by Mr. Wright. On the table there was a donation to the museum, by Mr. P. M'Donald, consisting of a quantity of Simaba cedron—a substance used in South America instead of quinine, in ague, &c.

Dr. Edwards mentioned the fact that the London deputation to Lord Granville on the Sale of Poisons Bill did not have their anticipated interview on Saturday, in consequence of the resignation of the Ministry, and a conversation ensued as to the probability of the matter being taken up by the new Ministry. Dr. Edwards said he was not quite sanguine that the subject would be allowed to drop, because the Earl of Derby was a member of the Lords committee, and took considerable interest in the subject, asking a great many questions. It was in consequence of the interest he took that there was a deputation from Liverpool to make a statement before that committee, and therefore he thought it was probable it would be forwarded a stage; much more likely than if the bill had been proposed in the Commons. He rather doubted that it would be stopped. In the course of further conversation, it was remarked that the Earl of Derby, from the nature of the questions he asked, might certainly be presumed to be unfavourable to the measure in its present obnoxious

shape, particularly as regarded Chemists, and therefore not likely to cause the bill to be resumed.

The PRESIDENT exhibited a specimen of the new drug Kamala (Rottlera Tinctoria), a recent importation from India, where it is largely used in dyeing, and of great repute as a medicine. The President said his reason for drawing attention to this drug was, that it seemed likely to assume an important position in this country, and he read the information respecting it that had from time to time appeared in the *Pharmaceutical Journal.*

Several samples of tinctures, &c., made with methylated spirit, were laid on the table, and which were carefully examined by a number of gentlemen present in order to test their character and merits, and the general opinion elicited was, that those intended for outward use were unobjectionable, and the use of methylated spirit in making these tinctures cheaper, would confer a great boon on the poorer classes. For veterinary practice, the use of methylated spirit for any purpose where pure spirit is used, appeared to be quite admissible, and no doubt would shortly become almost universal. It was also strongly advocated by several speakers that the duly qualified and registered Pharmaceutical Chemist should be allowed the use of pure spirit duty free for all purposes connected with the preparation of medicines.

The eleventh meeting of the present session was held on Thursday evening, the 11th of March, at the Royal Institution,

THE PRESIDENT, H. SUGDEN EVANS, ESQ., IN THE CHAIR.

Mr. WILLIAM H. SAMUEL introduced to the notice of the society a novel mode of illustrating scientific works and books of travel, by means of stereoscopic views; and, as an instance, submitted to inspection Mr. Piazzi Smyth's "Teneriffe," just published, and accompanied by a small portable stereoscope for viewing the illustrations.

The CHAIRMAN next introduced the subject of the quality of lemon juice supplied to emigrant and other ships sailing from the port of Liverpool. He had had occasion to make analyses of several samples, and found a great number of them spurious imitations of the genuine juice, being composed of a solution of tartaric acid in water, fortified by oil of vitriol and flavoured with essence of lemon. The following are the results of the analysis of several samples of pure and spurious lemon juice by Mr. Evans:—

PURE MESSINA LEMON JUICE.

	I.	II.	III.	IV.	V.
Citric Acid	12.77	4.35	7.04	9.56	7.50
Alcohol	0.00	2.28	2.07	3.08	2.75
Earthy Salts	.34	.45	.40	.37	}
Extractive	.16	.13	.23	.23	} 89.75
Water	86.73	92.79	90.26	86.76	}
	100.00	100.00	100.00	100.00	100.00

SPURIOUS JUICE.

	I.	II.	III.	IV.
Tartaric Acid	2.91	2.04	2.65	4.5
Sulphuric Acid	.09	.13	.12	Trace.
Water, Extractive, &c.	97.00	97.83	97.23	95.5
	100.00	100.00	100.00	100.00

By this means a cheap substitute was obtained, but differing most essentially from lemon juice, which should not contain a particle of tartaric or free sulphuric acid, and which alone can be relied on as a *preventive* to scurvy. He had been informed, on reliable authority, that very large quantities of these spurious compounds were

annually consumed, being supplied at prices far below those at which genuine juice could be imported. He thought, however, the whole of the blame did not rest with the dealers—the public is equally blamable, being so much actuated by a love of cheapness; and he proposed, as a remedy, that the authorities should insist upon an analysis being provided with each sample, and, whenever the fraud is discovered, enforcing the penalty provided by the Merchant Shipping Act. There could be no excuse for the omission of this very plain duty, as the process of testing is so simple and inexpensive.

Dr. Edwards thought the principal safeguard would be in giving publicity to the cases that came under their notice, and he should like to see the names of persons supplying such articles published. Some further conversation followed, during which Dr. Edwards expressed a wish that the medical inspectors of ships would bring every case of adulteration that they met with before the society.

Don Manuel Pacheco then read a paper on Fermentation. He commenced by defining the term, after which he noticed successively the chemistry of the various species of fermentation, saccharine, vinous, acetous, &c., after which he entered into a general description of the process of malting, mashing, the character of wort, the action of yeast on the latter, and the chemical changes resulting. He next alluded to the formation of wine and acetic acid from the juice of the grape, and concluded by a few general observations on panary and lactic fermentation, after which the President proposed a vote of thanks to Don Manuel Pacheco for his able and interesting paper, which was carried by acclamation.

MANCHESTER PHARMACEUTICAL ASSOCIATION.

At a meeting of the Committee of the Manchester Pharmaceutical Association, held on the 17th of March, Mr. Standring in the chair, the following resolutions were passed unanimously:—

Moved by Mr. Wilkinson, seconded by Mr. Lynch, "That Mr. Standring be nominated by this Committee for election as a Member of the Council of the Pharmaceutical Society, and that the Secretary be requested to communicate this resolution to Mr. Bremridge."

Moved by Mr. Standring, seconded by Mr. Lynch, "That Mr. W. Wilkinson be appointed Local Secretary to the Pharmaceutical Society for the remainder of the year, in the room of the late Mr. Woolley."

Mr. Wilkinson will consequently undertake the duties of Local Secretary until the Annual Meeting of the Pharmaceutical Society, when a General Meeting of the Pharmaceutical Chemists in the district will be called for the purpose of appointing a Local Secretary for the ensuing year.

ORIGINAL AND EXTRACTED ARTICLES.

ACIDUM PHOSPHORICUM DILUTUM.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—Without being able of my own knowledge to answer the query of Mr. Whipple, I gladly seize an opportunity of saying something respecting the preparation of Acidum Phosphoricum Dilutum, P.L.; but in order to be somewhat relevant, will first quote from M. Personne's original paper (*Journ. de Ph. et de Ch.*, *tome* 32, Oct. 1851) some paragraphs bearing on the question of the poisonous or non-poisonous action of phosphorous acid.

M. Personne begins by saying that his communication is not for the purpose of describing red phosphorus, already so fully described by Schroetter, but of making known certain facts that had escaped that able Chemist, and at the same time of proving that the highly poisonous action attributed to (PO_3) by Wœhler and Frerichs is far from being so well founded as those Chemists appear to think.

He proceeds to show that red phosphorus, even after very careful purifi-

cation, is, like the ordinary variety, attacked by atmospheric oxygen, and converted into (PO_3) and (PO_5), but very slowly; the action, moreover, being the more rapid, the more finely-divided the phosphorus.

But red phosphorus had been proved to be destitute of poisonous action, and this innocuity had been ascribed to its non-oxydation.

This latter assumption being now proved to be incorrect, "it is important to solve the question by direct experiments, that can leave not the least doubt of the poisonous action or innocuity of phosphorous acid. For this purpose I have given to dogs quantities of phosphorous acid, varying from 0.6 grm. to 1.45 grm. of the supposed anhydrous acid. Six dogs have been employed in these trials; in all the dogs the æsophagus has been tied after the injection of the diluted acid into the stomach, and to my great astonishment, these animals have all of them lived six, eight, or even nine days after the injection of the pretended poison. I will add, that for each of these six experiments, I have employed a phosphorous acid proceeding from a special operation, and the quantities of acid have been, for greater exactitude, tested by means of the transformation of the perchloride of mercury into protochloride, according to the following æquation:

$$PO_3 + 4\ Hg\ Cl + 2\ HO = PO_5 + 2\ (Hg_2Cl) + 2\ H\ Cl.$$

"The acid that has served for these experiments has always been obtained by the decomposition of protochloride of phosphorus by water, and the evaporation of the acid liquor over lime in an exhausted receiver."

The eventual death of the dogs is accounted for by "their prolonged abstinence," and "the results of the injuries consequent on tying their æsophagus."

The point I mainly wish to insist on, is the great advantage of adopting M. Personne's suggestion, that red phosphorus, in fine division, is, from the readiness with which it is attacked by dilute nitric acid, exceedingly well adapted for the preparation of tribasic phosphoric acid.

I have always been annoyed by the tediousness of the P. L. process, and have sometimes been unfortunate in either breaking apparatus or burning my fingers, and not having been able hitherto to devise a better process, I gladly adopted the idea of M. Personne, and attempted its preparation, using the exact quantities prescribed in the London Pharmacopœia.

On pouring, however, the acid on the phosphorus, I observed an immediate sense of warmth, and I had only just time to transfer the mixture to a large jug, and carry it into the open air, before very rapid chemical action commenced, with evolution of red nitrous fumes.

When the reaction had almost ceased the mixture was transferred to a basin, and a gentle heat applied until the nitric acid was exhausted, and a syrupy acid obtained.

When tested with nitrate of silver, it revealed abundance of phosphorous acid; which was oxydized to (PO_5) by the addition of nitric acid equal to about one-third of the quantity originally taken.

This large loss may be in part prevented by using the nitric acid diluted by three instead of two parts of water. The action then proceeds quietly, and no red vapours are eliminated. The action nearly ceases when about half the phosphorus is dissolved. (The solution then contains, besides (PO_5) and (PO_3), what I believe to be (PO) hypophosphorous acid, the presence of which is indicated by a white precipitate with nitrate of silver, passing into black on the application of heat.) It is finished by the application of heat, and the addition of one-fourth the original quantity of nitric acid, or sufficient to raise all the oxides to (PO_5). I think this extra expense of nitric acid is amply compensated for by the absence of personal danger, and the saving in glass retorts and condensers, whose occasional fracture cannot be avoided in the old process.

Hoping these remarks may prove useful to my brethren,

I am, Sir, your obedient servant,

Weymouth, March 18th, 1858. Thomas B. Groves, F.C.S.

ON THE ERGOT OF RYE.

BY MR. JOHN MORLAND.

Last autumn, Mr. Crace Calvert and myself examined some pills, which had been placed in his hands by some magistrates in Yorkshire, as forming part of a larger quantity, which had been given with intention to produce a miscarriage.

The pills were successively exhausted by ether, alcohol, and water, and the insoluble residue left on decanting the water, was examined, and found to be an organic substance, which under the microscope presented a particular and characteristic appearance, which I found to be identical with the residue left by some powdered ergot of rye, treated with the same solvents.

I was desirous of confirming the above result, by ascertaining what characters the ethereal, alcoholic, and aqueous extracts should yield; but on referring to works on toxicology, I found that they had not been submitted to any examination, so as to offer tests to enable the operator to distinguish a solution of ergot of rye from that of other substances, presenting similar medicinal properties, as gamboge, aloes, colocynth, and savine. I therefore thought that it would be interesting to examine the characters which such solutions, made from the ergot of rye, would give. I ascertained that the ethereal extract presented no characteristic chemical property, and that the aqueous solution, owing to its being constantly turbid, was unsuited for giving distinct reactions. I therefore was led to select the alcoholic solution, which was of a deep red purple colour; and to prevent the alcohol interfering with the various tests that I intended employing, I heated the extract with water, until nearly the whole of the alcohol had been expelled. The aqueous solution thus obtained had not only the above colour, but also the disagreeable aromatic odour characteristic of ergot. This solution, as well as that obtained from the pills, gave the following reactions with the undermentioned reagents:—

Caustic alkalies darken it to crimson; the solution gradually precipitates lake flocks; acids produce them directly.

Sulphuric acid renders it turbid, and impairs the colour.

Nitric acid and chlorine render the solution yellowish. The colour is partly restored by potash.

Persulphate of iron throws down a grey precipitate, soluble in an excess of the salt. The solution remains dark brown, probably from the presence of gallic acid.

Sulphate of alumina gives a purplish lake.

Sulphate of copper throws down a purplish-brown precipitate, and upon boiling the filtrate, a greenish one.

Ammonio-sulphate of copper yields first a purplish precipitate, and on further addition of the reagent, a bluish one.

Protonitrate of mercury gives a black precipitate, dissolved by nitric acid. This precipitate is not metallic mercury.

Bichloride of mercury produces a reddish precipitate, becoming on exposure greyish-rose.

Nitrate of silver yields a greyish-yellow precipitate.

Nitrate of lead no precipitate.

Subacetate of lead gives a dense white precipitate.

Sulphate of zinc affords a purple lake.

Nitrate of cobalt yields no precipitate.

Bichloride of platinum gives a brown precipitate.

Tincture of iodine has no action.

The most characteristic of these reactions are those with caustic alkalies, the salts of copper, and with the sulphates of zinc and alumina. I believe that these tests, combined with the appearance of the washed residue under the microscope, will prove sufficient for the detection of this drug, when it has been employed as a powder.

The colouring matter of the ergot of rye can be obtained equally well from the grain as from the powder. It is therefore probable that it exists in the outer layer of the diseased grain.

I was led to believe that it would be interesting to ascertain if the colouring matter which had given the above marked reactions, was nitrogenous or not. I therefore precipitated it from its aqueous solution by pure sulphate of copper. The precipitate so produced was collected, washed, suspended in water, and submitted to a stream of sulphuretted hydrogen. The whole of the precipitate was decomposed, the aqueous liquor was filtered off, and evaporated to dryness. The residue yielded ammonia on calcination. This result is in my opinion of some importance in this case, as few vegetable colouring matters are nitrogenous.

SULPHUROUS ACID.

BY PROFESSOR F. CRACE CALVERT, F.C.S., M.R.A. OF TURIN.

The application of this acid to manufactures has been much impeded by the difficulty which the preparation of its solution presents on a large scale; for the production of sulphurous acid, as given in books, is always dangerous, especially when its solution has to be prepared in large quantities. This difficulty I have overcome by a process which I here give to the public, and which enables me to prepare thousands of gallons per day of a saturated solution. The process consists in burning sulphur in a small furnace, and conducting the acid gas through earthenware tubes, surrounded with water so as to cool them. It is then made to ascend through a wooden column, forty feet high, and about four feet wide, filled with pumice-stone which has been previously washed with muriatic acid and then with water. Whilst the acid ascends through the porous pumice-stone, it meets a certain and known quantity of water descending, which dissolves the acid. By opening, more or less, a valve at the top of the column, a more or less rapid current is established. With a little care, a saturated solution runs out constantly from the bottom of the column into a confined reservoir, in which it is stored for use until required.

REFINING OF SUGAR.

I was led to contrive the above process from a wish to use sulphurous acid in sugar-refining, convinced that it would be far superior to the sulphite of lime (which was so strongly recommended a few years ago by MM. Dumas and Melsens), because, that by its volatility, it would not remain in the syrups or molasses, and give them, as the sulphite does, a disagreeable taste, in consequence of the lime of the sulphite remaining in the syrup as acetate or lactate. These anticipations were not only realized, but I also found that sulphurous acid possesses two advantages for the sugar-refiner; 1st, that it stops the fermentation of his hot liquors as they come out of the filters; and 2ndly, when properly applied, it tends to prevent the re-colouration of the liquors during their concentration in the vacuum pan. In practice I found that very successful results were obtained by adding two gallons of a saturated solution of sulphurous acid to every 100 gallons of decolourized liquor, as it left the char-filter, and was collected in tanks, until pumped up or run into the vacuum pan.

DISEASED BEERS.

Several brewers of late have suffered by their beer becoming rapidly sour after it was barrelled, owing to an acetic fermentation succeeding an alcoholic one. I was consulted as to the best means of preventing this acid fermentation;

and the process recommended by me is very simple and practical. It consists in the employment of sulphurous acid in solution or as a gas. But I found that mere sulphurization of the casks did not suffice. To ensure perfect success, it is necessary to soak well the fermenting vats and barrels, and also to thoroughly wash the coolers with a solution of sulphurous acid,—in fact, all the various vessels used in a brewery should be treated by this antiseptic before satisfactory results are obtained.

REPORT OF THE

RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,

AND OF THE

APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

BY B. H. PAUL, Ph.D.

(*Continued from p.* 462.)

Chemical Relations of Dutch Liquid.—The differences between this substance and chlorinated chloride of ethyl, with which it is isomeric, render it probable that it belongs to the glycol rather than the alcohol series. In this case it would be the chloride of the glycol radical, having the same relation to glycol that chloride of ethyl has to alcohol:—

Type.	Alcohol.	Chloride of ethyl.	Dutch liquid.	Glycol.	Type.
$\left.\begin{matrix}H\\H\end{matrix}\right\}$	$\left.\begin{matrix}C_4H_5\\H\end{matrix}\right\}O_2$	$\left.\begin{matrix}C_4H_5\\Cl\end{matrix}\right\}$	$\left.\begin{matrix}C_4H_4\\Cl_2\end{matrix}\right\}$	$\left.\begin{matrix}C_4H_4\\H_2\end{matrix}\right\}O_4$	$\left.\begin{matrix}H_2\\H_2\end{matrix}\right\}$

M. Wurtz* has succeeded in converting glycol into Dutch liquid, by the action of perchloride of phosphorus:—

$$C_4H_6O_4 + 2\,PCl_5 = C_4H_4Cl_2 + 2\,HCl + 2\,PO_2Cl_3.$$

The conversion of Dutch liquid into C_4H_3Cl and HCl is a consequence of the tendency of diatomic substances to split into monatomic substances with elimination of water or hydrochloric acid. Glycol is a diatomic alcohol parallel with a monatomic alcohol, $C_4H_4O_2$, isomeric with aldehyde, and there is the same relation between the corresponding chlorides.

Glycol	$C_4H_6O_4$	=	$C_4H_4Cl_2$	Dutch liquid
	$C_4H_4O_2$	=	C_4H_3Cl	Chloride of acetyl

By the reaction of iodide of ethylene, $C_4H_4I_2$, with acetate of silver, aceto-glycol is produced, $\left.\begin{matrix}C_4H_4\\2[C_4H_3O_2]\end{matrix}\right\}O_4$, from which glycol is produced by reaction with caustic potash.

The general relations of monatomic, diatomic, triatomic, &c., alcohols, and of their derivatives, are similar to those of the mono-, bi-, and tribasic acids. The aldehydes would be anhydrides of the diatomic alcohols; thus:

Type.	Aldehyde.	Glycol.	Succinic anhydride.	Succinic acid.
H_2O_2	$(C_4H_4)O_2$	: $C_4H_6O_4$ =	$C_8H_4O_6$	: $C_8H_6O_8$

And, if this be the case, the aldehydes should yield with pentachloride of phosphorus the chlorine compounds $Cn\,Hn\,Cl_2$.

Products of the Action of Chlorine upon Alcohol.—

Monochlor-acetal, $\left.\begin{matrix}C_4H_3Cl\\[C_4H_5]\,2\end{matrix}\right\}O_4$. An oily liquid of agreeable odour; density 1.0195; vapour density 5.38. Boiling point between 150° C.—160° C.

Dichlor-acetal, $\left.\begin{matrix}C_4H_2Cl_2\\[C_4H_5]\,2\end{matrix}\right\}O_4$. An oily liquid, insoluble in water; density 1.1385 at 14° C.; vapour density 6.45; not decomposed by caustic potash. Boiling point above 170° C.

These substances were obtained† by the action of chlorine upon spirit containing 80 per cent. alcohol, and separated by fractional distillation. M. Dumas obtained trichlor-acetal in the same way.

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* *Comptes Rendus*, xlv., 228.

† Ad. Lieben—*Comptes Rendus*, xliv., 1345.

With very dilute alcohol, chlorine gives rise to the production of aldehyde, formic ether, acetic ether, acetal, monochlor-acetal, and perhaps also glycolic acid, constituting together the heavy muriatic ether.

Between trichlor-acetal and chloral there is the same relation as between acetal and aldehyde. It is remarkable that all these substances correspond in the number of atoms, either actually or as multiples, with Dutch liquid.

			Type.
Dutch liquid		$C_4\ H_4\ Cl_2$	$C_4\ H_6$
Aldehyde		$C_4\ H_4\ O_2$	
Acetal	triple	$C_{12}\ H_{14}\ O_4$	
Chlor-acetal	triple	$C_{12}\ H\ Cl_{13}\ O_4$	
Dichlor-acetal	triple	$C_{12}\ H_{12}\ Cl_2\ O_4$	
Trichlor-acetal	triple	$C_{12}\ H_{11}\ Cl_3\ O_4$	
Chloral		$C_4\ H\ Cl_3\ O_2$	

Derivatives of Naphtylamin.—Dr. Schiff* has obtained the following substances :—

Iodide of ethyl naphtylammonium, $N\ \overline{|C_4\ H_5,\ C_{20}\ H_7|}\ H_2,\ I$.—Produced by the action of iodide of ethyl with naphtylamin. Crystallizes as shining four-sided prisms.

Bromide of ethyl-naphtyl-ammonium, $N\ H_2\ \overline{C_4\ H_5,\ C_{20}\ H_7|}\ Br$.— Acicular crystals, very sparingly soluble in water, soluble in alcohol and ether. Less readily decomposed than the iodide.

The haloid compounds of ethyl-naphtylamine yield with potash, naphtylamine, and not ethyl-naphtylamine.

Sulphate of naphtylamine and cyanate of potash yield naphtylamine and ordinary urea, not naphtyl-urea.

Naphtyl-urea, $C_2H_3\ \overline{|C_{20}\ H_7|}\ N_2\ O_2$.—Produced by the action of gaseous cyanic acid upon naphtylamine dissolved in anhydrous ether. Crystallizes as shining, flat, flexible needles. Scarcely soluble in water, more so in ether, and copiously in alcohol.

Bromide of naphtylammonium, $N\ H_3\ \overline{|C_{20}\ H_7|}$, Br.—Produced by the reaction of sulphate of naphtylamine with bromide of barium in alcoholic solution. Crystallizable. Sparingly soluble in water.

Oxynaphtylamine, $N\ H_2\ \overline{|C_{20}\ H_7|}$, O_2.—Produced by the action of naphtylamine salts with perchloride of iron, chlorides of gold, platinum, mercury, zinc, chromic acid, or nitrate of silver. It is the substance called naphtamein by Piria, and does not, as he supposed, originate from naphtylamine, by separation of water and ammonia, but by simple oxidation.

Dinaphtyl-Sulphocarbamide, $N\ H_2\ \overline{|C_{20}\ H_7|}_2\ C_2\ S_2$.—Produced by heating naphtylamine with bisulphide of carbon in a sealed tube, by a water-bath for some hours. Naphtylsulphocarbimide, $N \left\{ \begin{matrix} C_2\ S_2 \\ C_{20}\ H_7 \end{matrix} \right.$, was not produced.

It is probable that sulphocyanogen is sulphocarbimide, $N \left\{ \begin{matrix} C_2\ S_2 \\ H \end{matrix} \right.$, for its production and decomposition agree with this view. It is also probable from the fact that other sulphocyanogen compounds have been shown to have the constitution of amid compounds of sulphocarbonic acid. Thus hydrothiosulphocyanic acid may be sulphocarbaminic acid, $\begin{matrix} NH_2\ C_2\ S_2 \\ H \end{matrix} \Big\}\ S_2$; hydranzothin may be sulphocarbammonium sulphide, $N_2 \left\{ \begin{matrix} (C_2\ S_2)_2 \\ H_4 \end{matrix} \right\}\ S_4$; rubeanhydride may be sulphoxamide, $N_2 \left\{ \begin{matrix} C_4\ S_4 \\ H_4 \end{matrix} \right.$. There seems to be an analogy between the production of this latter substance and that of sulphobenzamide from the nitrile of benzoic acid —$C_{14}\ H_5\ N + 2\ HS = C_{14}\ H_7\ NS_2$. Sulphoxamide is derived from the nitrile of oxalic acid or cyanogen —$C_4\ N_2 + 4\ HS = C_4\ H_4\ N_2\ S_4$. By the reaction of sulphuretted hydrogen with an alcoholic solution of cyanide of ethyl-propionnitril, Dr. Schiff obtained a crystalline sulphuretted substance, probably sulphopropion. The yellow substance ($C_2\ H\ NS$, flavean

* *Ann. Chem. Pharm.*, ci. 90.

hydride) produced together with sulphoxamide would appear to be an ammonium, $N_2(C_4 S_4, H_4, Cy_2)$, having the same relation to sulphoxamide that cyanide of aniline has to aniline.

The substance described by Chiozza as carbostyryl is very probably styryi carbimide, $N \left\{ \begin{matrix} C_2 O_2 \\ C_{16} H_7 \end{matrix} \right.$

Aniline and naphtylamine do not react, even when heated together for a long time.

Cyanide of phenyl, $C_{14} H_5 N$,=Ph Cy (benzonitril), is produced by the reaction of sulphocyanide of potassium with chlorbenzoyl; of cyanate of potash with chloride of benzoyl or with benzoic anhydride, and by the reaction of sulphocyanide of potassium with benzoic anhydride. Phenyl sulphuric acid, $(C_{12} H_5) H, S_2 O_8$, does not yield cyanide of phenyl when distilled with cyanide of potassium, or sulphide of phenyl when distilled with sulphide of potassium.

Phenylcarbaminic acid, $NH, [C_{12} H_5] CO_2, O_2$ (Benzaminic acid).—Produced by the reaction of iron and acetic acid with nitrobenzoic acid. The mixture was evaporated to dryness on the water-bath, the residue digested with caustic potash, and the acid precipitated by hydrochloric acid. Dr. Schiff considers this the best representation of the constitution of this substance, because by heat it is decomposed into aniline and carbonic acid, and also on account of its production. Thus benzoic acid may be regarded as phenyl formic acid, $\left. \begin{matrix} C_2 [C_{12} H_5] \ O_2 \\ H \end{matrix} \right\} O_2$; and if there were a derivative of formic acid containing hyponitric acid in the place of hydrogen, this might be converted by reduction into carbaminic acid, thus—

$$\left. \begin{matrix} C_2 (NO_4) \ O_2 \\ H \end{matrix} \right\} O_2 + 6\,H = \left. \begin{matrix} NH_2 \, C_2 \, O_2 \\ H \end{matrix} \right\} O_2 + 4\,HO$$

Nitrobenzoic acid corresponds to such a formic acid, and contains phenyl, $C_{12} H_5$, in the place of hydrogen. It yields, by reduction, benzaminic acid.

Further, the amides of bibasic acids are decomposed by potash into ammonia and the potash salts of the corresponding aminic acids, so that carbamide would yield carbaminate of potash—

$$N_2 \left\{ O_2 H_4 C_2 + KHO_2 = NH_3 + \left. \begin{matrix} NH_2 \, C_2 \, O_2 \\ K \end{matrix} \right\} O_2 \right.$$

Consequently, phenylcarbamide would yield phenylcarbaminic acid, and the acid obtained in this way by Chancel is identical with benzaminic acid. In like manner, the acids called amidocinnamic and amidocuminic are to be regarded as true aminic acids, homologous with phenylcarbaminic acid.

Type.

$$\left. \begin{matrix} NH_4 \\ H \end{matrix} \right\} O, \quad \left. \begin{matrix} NH \, [C_{12} H_5] \, C_2 \, O_2 \\ H \end{matrix} \right\} O_2 \quad \left. \begin{matrix} NH \, [C_{16} H_7] \, C_2 \, O_2 \\ H \end{matrix} \right\} O_2 \quad \left. \begin{matrix} NH \, [C_{18} H_{11}] \, C_2 \, O_2 \\ H \end{matrix} \right\} O_2$$

According to this view, phenylcarbaminic acid should be produced from aniline, phenylamine, and carbonic acid.

The acid obtained by Fritsche from indigo, and called anthranilic acid, has the same empirical composition as phenylcarbaminic acid; but as it yields salicylic acid, it is probably nearer allied to the salicyl group, although it appears, according to Limpricht, not to be identical with salicylaminic acid.

Phenylcarbaminic acid, like anthranilic acid, is converted by hyponitrous acid into an acid (oxybenzoic) having the same composition as salicylic acid ($C_{14} H_6 O_6$), but differing from it in characters. Since this acid originates from an acid that contains both carbonyl and phenyl, and since hyponitrous acid does not affect these radicals, they will most probably exist in the product, which would then have a constitution represented by the formula $\left. \begin{matrix} C_4 \, O_5 \\ C_{12} H_5, H \end{matrix} \right\} O_4$, acid phenylether, or phenylcarbonic acid. This view of the constitution of the acid is supported by the fact, that it is converted into phenylcarbonic acid and alcohol by the action of potash. The substance described by Laurent as ampelinic acid has also the same composition, and is perhaps identical with phenylcarbonic acid.

When naphtylamine is acted upon by a mixture of nitric and sulphuric acids it acquires a dark green colour, and yellowish-red flocculent precipitate is produced, probably nitronaphtylamin, obtained by Laurent by the action of sulphuretted hydrogen upon binitronaphtalin. By the action of iron and actic acid this sub-

stance is converted into a base presenting the characters of azonaphtylamin, $C_{20} H_{10} N_2$.

Naphtylamin decomposes spontaneously, yielding a resinous purple substance, which is coloured violet by acids, and red by alkalies, similar to the substance recently obtained by Church and Perkins by the action of hyponitrous acid upon naphtylamin ($C_{20} H_8 (NO_2) N$). Laurent also describes a scarlet substance, carminnaphte, obtained by the action of chromic acid upon naphtalin, and naphtase, obtained by distilling nitronaphtalin with lime, which colours sulphuric acid violet. Dusart also obtained coloured substances by the action of potash lime upon nitronaphtalin.—The red colour of madder is considerably heightened by alkalies, and there is probably some connexion between these coloured substances and the madder pigments.

Acid Amides of the Aromatic Acids.—The amides produced by the reduction of nitro acids, either by sulphide of ammonium or acetate of protoxide of iron, are analogous in their chemical characters to alkaloids, and should be classed with glycocol, alanin, and leucin.* Thus benzaminic acid forms definite compounds with phosphoric, oxalic, hydrobromic, hydrochloric, sulphuric, and nitric acids. The other acid amides also form similar compounds, and their hydrochloric salts correspond entirely with those of the alkaloids, forming double salts with bichloride of platinum.—The sulphates of these amides have all a sweet taste.

Benzaminic acid also resembles glycocol in presenting isomeric relations with several other substances; as, for instance, salicylaminic and anthranilic acids. It bears the same relation to salicylamide that glycocol does to glycolamide and alanin to lactamide.

Glycolamide is produced in the same manner as salicylamide, by reduction of the corresponding acid by ammonia; consequently the production of glycocol from mononitro-acetic acid, by reduction with sulphuretted hydrogen, might be expected.

$$C_4 H_3 (NO_4) O_4 + 6\,SH = C_4 H_5 NO_4 + 4\,HO + 6\,S$$

Chloride of cumyl, and chloride of anisyl, yield with oxide of silver-glycocol, substances analogous to hippuric acid, which is produced by the reaction of glycocol upon chloride of benzoyl.

Hippuric acid, $C_{18} H_9 NO_6$. Cuminuric acid, $C_{24} H_{15} NO_6$. Anisuric acid, $C_{20} H_{11} NO_6$.

Fermentation.—M. Pasteur has extended his observations of the characters of amylic alcohol, and of the crystallography of its derivatives, to the investigation of the phenomena of fermentation, and has arrived at results which he believes to indicate a remarkable connexion between the phenomena of fermentation and the characters of molecular dissymmetry of organic substances.

He treats first of that kind of fermentation which gives rise to the production of lactic acid. This is known to take place when a solution of sugar, mixed with chalk, for the purpose of keeping the liquid neutral, is brought in contact with nitrogenous substances, such as casein, gluten, animal membrane, &c. The essential nature of this phenomenon is, however, very obscure; the special influence of the nitrogenous substance is altogether unknown. Its mass is not sensibly diminished. It does not necessarily become putrid. Nevertheless, it undergoes a progressive alteration, although it is difficult to say in what this alteration may consist.

Previous investigations have not led to the detection of the development of vital organisms during the lactic acid fermentation, otherwise than accidentally, and without any intimate connexion with the process itself.

These facts appear, therefore, to bear out the views of Professor Liebig, who regards a ferment as a substance eminently susceptible of change, and capable, while undergoing decomposition, of exciting fermentation of a substance with which it is in contact, as a consequence of its own alteration, by disturbing the molecular constitution of the fermentible substance. According to Professor Liebig, this is the primary cause of all kinds of fermentation, and also the origin of most contagious diseases.

This view has gradually gained recognition, and has been maintained in the memoirs written on the subject by MM. Fremy and Boutron, M. Gerhardt, and quite recently, by M. Berthelot. The investigations of these chemists all agree in

* Cahours—*Comptes Rendus*, xliv., 567.

tending to discredit the influence, in any way, of organization and vitality, as the cause of the phenomena of fermentation.

M. Pasteur has, however, been induced to adopt an entirely different view. In the first place, he endeavours to prove, that in the same way that there is a special alcoholic ferment—beer, yeast—which is met with wherever sugar is converted into alcohol and carbonic acid; so in like manner there is a lactic ferment, which presents itself wherever sugar is converted into lactic acid, and if any nitrogenous substance is capable of inducing this latter change, it is by furnishing the material requisite for the development of the appropriate ferment.

During the progress of the ordinary lactic acid fermentation, it is sometimes possible to recognize, above the sediment of chalk and nitrogenous substance, particles of a grey substance, forming a zone upon the surface of the sediment. When these particles are examined by the aid of the microscope, it is scarcely possible to detect any disintegrated casein or gluten, so that there is nothing to indicate that this is a peculiar substance that has originated during the progress of the fermentation. Nevertheless, M. Pasteur regards this substance as exercising a principal and essential influence. The following is the plan he adopted for obtaining it apart, and in a state of purity.

Beer-yeast was deprived of its soluble portion by digesting it for some time with fifteen or twenty times its weight of boiling water. In the filtered liquid, sugar was dissolved, in the proportion of fifty grammes to the litre. Some chalk was then added, and a very small portion of the grey substance spoken of above, taken from a liquid in an active state of lactic fermentation. By the next day active and regular fermentation had set in. The liquid, which at first was perfectly clear, had become turbid, the chalk gradually disappeared, and at the same time a sediment was deposited, increasing in proportion to the solution of the chalk. In addition, all the well known characteristic features of lactic fermentation were presented by the liquid. With the same result, the decoction of beer-yeast might be replaced by a decoction of any other nitrogenous substance, either in a fresh or stale condition.

The characters of this substance, whose production is correlative with the phenomena included by the term lactic fermentation, are thus described by M. Pasteur. In appearance it resembles beer-yeast in a strained or pressed state. Examined by the aid of the microscope, it is seen to consist of little globules or very short articulations, either isolated or in threads, constituting irregular flocculent particles. The globules are very much smaller than those of beer-yeast, and also present the Brownian motion. When washed with a large quantity of water, and then disseminated throughout some pure solution of sugar, acidification is produced immediately, and progresses, though very gradually, in consequence of the acid interfering with the influence of the ferment upon the sugar. But when chalk is added, so as to keep the liquid neutral, the transformation of the sugar is much accelerated; and, even when operating with a very small quantity of substance, in less than an hour the disengagement of gas becomes evident, while the liquid becomes charged with lactate and butyrate of lime. A very small quantity of this ferment is sufficient to effect the transformation of a large amount of sugar.

Hence M. Pasteur infers that the lactic fermentation resembles the alcoholic fermentation, in being an act correlative to the production of a nitrogenous substance, which has all the characters of a micodermic organism, probably very similar to that of beer-yeast. But the difficulties and complexity of the subject are far from being resolved by this fact. Lactic acid, although the principal product of the fermentation called lactic, is far from being the only one. It is always accompanied by butyric acid, alcohol, mannite, and a viscous substance, the relative proportion of these substances being subject to the most capricious variations. With regard to mannite, a very remarkable circumstance was observed—when substituted for sugar in the lactic fermentation, all other conditions remaining the same, alcohol is produced, together with lactic acid and butyric acid, by the fermentation of the mannite. This fact appears, at first sight, inconsistent with the production of mannite in lactic fermentation, at least it might be supposed that it would be decomposed again. But this apparent inconsistency is removed by a more close examination.

Thus, when the lactic ferment has been washed with a large quantity of water, and placed in contact with a solution of pure sugar, the transformation of the sugar decreases as the acidity of the liquid increases. By the analysis of the liquid, after neutralizing the acid with chalk and decomposing the residual sugar by fermentation

with beer-yeast, M. Pasteur found that it contained mannite and the viscous substance before mentioned, and he invariably found that sugar, brought in contact with the lactic ferment, is transformed into products, among which mannite is always present; but this is the case only when the liquid rapidly becomes acid, for when the liquid was kept neutral by the addition of chalk, all other circumstances remaining the same, neither gum nor mannite were produced; or, at least, neither of these substances remained in the liquid unaltered.

M. Berthelot has already shown that by substituting mannite for sugar in the lactic fermentation, that substance undergoes fermentation. It is easy to ascertain that in the numerous cases of fermentation of mannite, it is due to the production of the lactic ferment. When a solution of pure mannite is mixed with chalk and some fresh washed lactic ferment, at the end of a quarter of an hour disengagement of gas commences, and the chemical change of the mannite takes place, the products being carbonic acid, hydrogen, alcohol, lactic acid, butyric acid, and all the other products of the fermentation of mannite.

With regard to the production of butyric acid, experience has shown that the lactic ferment acts directly upon lactate of lime, converting it into carbonate and butyrate of lime. But the action of the ferment is first exercised upon sugar, and when it is present in the liquid, it undergoes fermentation in preference to lactic acid.

M. Pasteur has also studied the alcoholic fermentation experimentally, in the same manner. In reference to this phenomenon, he distinguishes as two principal cases, the action of beer-yeast upon a solution of pure sugar, and its action in the presence of albuminous substances. In the former case the yeast is exhausted, and becomes incapable of inducing further fermentation. In the latter case the activity of the yeast is not destroyed. In fact, the quantity remaining after the fermentation, is greater than that used. It is therefore regenerated, or rather it is exhausted, as in the former case; but since fresh ferment is produced, the consumption is disguised by the production. The amount of ferment that is consumed, is estimated in reference to the sugar, at about one per cent. of dry substance.

The decomposition of ferment accompanying its action upon pure sugar, is one of the facts most important in relation to the theory of Professor Liebig, who remarks in reference to it, that "if the fermentation were a consequence of the development and multiplication of the globules, they would not excite fermentation in a solution of pure sugar, which is destitute of other conditions essential for the manifestation of vital activity; this liquid containing no nitrogenous substance necessary for the production of the nitrogenous portion of the globules."

It cannot be denied that if well washed beer-yeast placed in contact with a solution of pure sugar, undergoes alteration, and is destroyed, there can be no possibility of pretending that alcoholic fermentation is a phenomenon correlative with the development of the globules.

But M. Pasteur goes on to show that the facts upon which Prof. Liebig bases his argument do not possess that degree of exactitude which has been ascribed to them; and also that, in the fermentation of a solution of pure sugar, there is an amount of vitality and organization equal to that manifested in the more ordinary case.

With the object of illustrating this experimentally, he took two equal quantities of fresh beer-yeast that had been washed with a large quantity of water, and placed one in contact with a solution of pure sugar. From the other portion, the whole of the soluble substance was extracted, by digesting it for some time with a large quantity of boiling water; the globules were separated by filtration; the clear liquid mixed with sugar, as in the other experiment; and so small a quantity of the fresh yeast added as would not interfere with the results of the experiment. The globules increased, the liquid became turbid, a sediment of yeast was gradually deposited, and meanwhile the sugar was transformed. These results might easily have been anticipated; but there is another fact which M. Pasteur points out as important to be considered. In determining by this artifice, the conversion of the soluble portion of yeast into organized globules, a considerable quantity of sugar is decomposed. In one instance, 5 grammes of yeast effected the decomposition of 12.9 grammes of sugar within six days, and was then exhausted. The soluble portion of 5 grammes of this yeast effected the decomposition of 10 grammes of sugar within nine days, and the yeast developed was also exhausted.

It appears, therefore, that, by bringing about the conversion of the soluble portion

of yeast into organized globules, a quantity of sugar may be decomposed which is nearly equal to that decomposed by the action of an equivalent quantity of the yeast in its natural state. The difference between the two quantities of sugar fermented in the above instance appears, moreover, easily explicable. The development of globules in the very dilute decoction of yeast may be expected to be retarded, and the extraction with water would probably not effect the separation of all the soluble portion of the yeast probably confined within the globules.

These results are directly connected with the explication of facts relating to the history of fermentation that have always appeared extraordinary. M. Thenard long since observed that yeast may be dried at 212° F., or heated to the boiling point, without its efficacy as a ferment being sensibly diminished. The sole peculiarity of its action under these circumstances, consists in the commencement and progress of the fermentation being slower than when the same yeast is used in the fresh state. These curious facts have been put forward by those chemists who adopt the views of Liebig and Berzelius, and deny the influence of organization as a cause of the phenomena of fermentation. It was argued, that exposure to a temperature of 212° F., whether combined with prolonged drying or not, would destroy the vitality of the yeast; and that, notwithstanding this treatment, the yeast will act as a ferment.

M. Pasteur's results, however, show that it is not the globules which exercise the most important function in fermentation, but the conversion of the soluble portion of the yeast into organized globules; for he shows that, when the globules are abstracted, the ultimate effect produced upon the sugar is essentially the same as when they are present. Therefore it is certainly of little consequence whether the globules are abstracted by filtration, as in M. Pasteur's experiment; or whether, when left mixed with the soluble portion, their vitality is destroyed by exposure to a temperature of 212° F., as in using yeast that has been dried at that temperature, or boiled with water. The globules collected by filtration, after having been exposed to a temperature of 212° F., are almost entirely incapable of exciting fermentation.

But, it may be asked, why does the fermentation of sugar take place under the influence of yeast that has been heated to 212° F., if that fermentation is only due to the conversion of the soluble portion of yeast into organized globules, seeing that such treatment would have the effect of destroying the vitality of the globules? With regard to this point, M. Pasteur believes that fermentation is commenced in such a case, in the same manner that it sets in with any saccharine liquid—such as grape juice, sugar-cane juice, &c.—that is to say, spontaneously; and he believes that to this mode of origin is to be ascribed the retardation, characteristic of fermentation produced by yeast that has been dried at 212° F., as well as its longer duration in this case.

Hence it would appear that in all cases, even those which might be regarded as furnishing the chief support of the opinion that organization does not exercise any causal influence on the phenomena of fermentation, the chemical change by which they are characterized is always correlative with the gradual and progressive formation of the organized globules.

M. Pasteur has also made some further observations, which confirm the results described already, and also throw a new light on the subject of fermentation. The existing theory sets out from the assumption that the ferment does not contribute anything to, or abstract anything from the fermenting substance. M. Pasteur, however, endeavours to show that this is not a correct representation of the fact, but that the yeast does abstract substance from the sugar, that the sugar is one of its aliments, and that there is not a chemical equivalence between the quantities of alcohol, and carbonic acid (lactic acid), on the one hand, and the quantity of sugar fermented on the other.

For the purpose of illustrating these facts he took two equal portions of well washed fresh yeast, dried one in a capsule, and ascertained the weight at 212° F. This weight would in any case be inferior to that of the other portion, also dried at 212° F., and collected only after it had been exhausted in the presence of an excess of sugar. The difference of weight was found to be variable, but it was always very sensible. It must be stated also that the most considerable sources of loss obtained in the case of that portion of yeast which weighed the most. This curious and unexpected result admits of the explication of a fact which, at the outset of M. Pasteur's investigations, caused him much surprise. When yeast is exhausted in

contact with a solution of pure sugar, it is admitted that the whole of its nitrogen passes into the state of an ammoniacal salt. In reality the quantity of ammonia produced during the fermentation is excessively minute, and very much less than that which should be obtained in order to account for the diminution of the amount of nitrogen in the yeast. But the diminution of azote is only apparent. It is due to the augmentation of the weight of the yeast by assimilation of sugar.

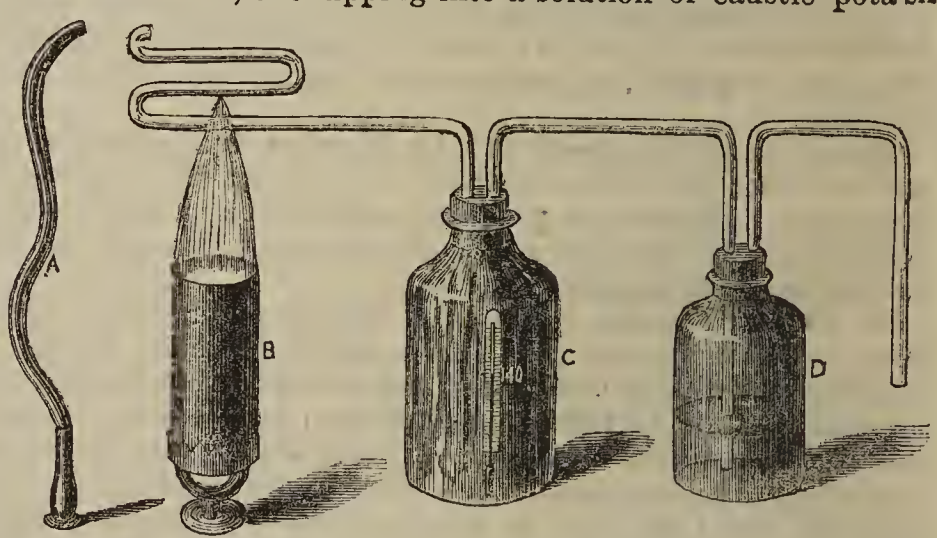
The inferences to be drawn from the preceding facts will be sufficiently evident. The transformation of sugar into alcohol and carbonic acid must be regarded as an act correlative with a vital phenomenon, an organization of globules in which the sugar takes a direct part, by furnishing material for their production.

Another result to which M. Pasteur attaches great importance, is the discovery of a mode of fermenting tartaric acid which affects the ordinary dextro-tartaric acid, but not the levo-tartaric acid. Consequently, when paratartaric acid, consisting of a mixture, molecule for molecule, of the two kinds of tartaric acid, is submitted to this mode of fermentation, the paratartaric acid is decomposed into dextro-tartaric acid, which ferments, and into levo-tartaric acid, which remains intact, so that this treatment is the best means of isolating the levo-tartaric acid.

He adds, also, that the products of the fermentation of tartaric acid, compared with those of the acids obtained by the fermentation of ordinary sugar, and joined to the curious relations between the crystalline forms of cane-sugar and dextro-tartaric acid, justify the opinion that cane-sugar has probably the same molecular constitution as that acid.

Arsenic in Paper Hangings.—In connexion with this subject, some experiments have been made by Mr. Dugald Campbell, which give a result contrary to the opinions expressed by Dr. Taylor and Dr. Halley, showing that arsenic is not volatilized by passing large quantities of air over strips of paper coloured with emerald green. The first set of experiments were made about six months ago, upon a moderately good green flock paper, in which the presence of arsenic had been detected by Marsh's and Reinsch's tests. A second set of experiments were made upon a paper having a pale green ground with a darker green flower pattern, in imitation of flock, also containing arsenic; and a third set of experiments were made about a week since, upon a very good green flock paper containing arsenic,

In all these experiments strips of the papers equal to a surface of about a square foot were placed, together with a thermometer, in a bottle, closed with a cork, through which passed two bent tubes, one dipping into a solution of caustic pota sh contained in a second bottle *D*, and the other, passing to the bottom of the bottle *C*, having several bends, so that the atmospheric air passing through it might be heated, by means of the gas flame *B*, to any desired temperature before entering the bottle containing the paper. Atmospheric air was then passed through the apparatus, by connecting the extremity of the bent tube with a bellows, by means of a caoutchouc pipe *A*, and the current was maintained for an hour in each experiment, several gas jets being burning in the room meanwhile.



The temperature of the air passed over the paper, varied in the several experiments from 60° F. to 140° F., the latter being far above any ordinary temperature in dwelling rooms. If arsenic were volatilized from emerald green by such treatment of paper, which exaggerates the conditions that may be regarded most favourable for the exercise of an injurious influence in ordinary cases, it would be abstracted from the air while passing through the alkaline solution in the bottle *B*. However, the chemical examination of this liquid after each experiment, did not in any instance indicate the presence of arsenic, even in the minutest degree.

It would appear from these facts, and also from the immense quantities of these arsenical pigments used for various purposes, that the coincidence of the symptoms described by Drs. Taylor and Halley, with the occupation of rooms hung with emerald green paper, by the persons affected, is probably accidental, and that the two facts do not bear the relation of cause and effect. It is, however, remarkable that the symptoms experienced are very closely alike in the different instances, viz., irritation of the throat, dryness of the tongue, nausea, loss of appetite, headache, &c. At the same time it is worth mentioning, that both in the case reported by Dr. Hind, of Manchester, and that of Dr. Halley himself, gas was burnt in the rooms; and, without attaching much weight to this fact, it may be just worth while ascertaining whether this was the case in other instances of ill effects supposed to arise from arsenical pigments, or whether there may not have been some other circumstance common to all these instances, that would remove the obscurity which now hangs over the subject, and furnish a clue to some more probable cause of the symptoms observed.

These results are precisely what might have been expected from the well-known characters of the arsenical green pigments, and, as they disprove the volatilization of arsenic, it is therefore difficult to perceive how such an influence as that described by Drs. Taylor and Halley can be exercised by these pigments in paper-hangings, with which the occupants of the rooms would have no communication except through the medium of the air.

Moreover, these same pigments are much used for other purposes, by which they are brought into direct contact with the body, such as the binding of books, and other materials that are handled, without any injurious effects being observed; and, according to Mr. Fletcher, a colour manufacturer, who prepares two tons of this emerald green weekly, the workmen who are daily engaged in the preparation of these pigments on a large scale, and have been so employed for years, "under the necessity of constantly handling them, are in the enjoyment of perfect health."

REMARKS ON THE MEDICINAL HYPOPHOSPHITES.*

BY WILLIAM PROCTER, JUN.

The recent researches of Dr. Churchill into the therapeutic character and value of the hypophosphites in tuberculosis, some account of which will be found at page 143 of this number,† have attracted much attention from physicians, and many inquiries have been made after these salts, and it is believed that a notice of the processes for preparing them, and some formulæ for their prescription, will be acceptable to the readers of the Journal, especially, as from their hitherto unimportant position among pharmaceutical chemicals, no mention is made of them in works most accessible. The salts which have been used are those of lime, soda, potassa, and ammonia. In the sequel a notice is given of these, of the hypophosphite of the sesquioxide of iron, and of hypophosphorous acid.

The hypophosphites, according to Gmelin, are mostly crystallizable. They cannot exist without a certain proportion of water, which is equally true of the acid itself, which in its most concentrated form contains three equivalents of water, one of which is replacible by bases. When heated till decomposed, these salts emit phosphuretted hydrogen. They are permanent in the air as regards oxidation; but when heated in solution, especially if free alkali is present, they are decomposed into phosphates and hydrogen gas. They are nearly all soluble in water, and several of them in alcohol, and readily reduce the soluble salts of silver and gold.

Hypophosphite of Lime is the most important of these salts, as it not only, by oxidation in the economy, will afford phosphate of lime in a nascent state, if needed, but its reactions with the carbonates of the alkalies give a ready means of obtaining the alkaline hypophosphites. When phosphorus is boiled with milk of lime, it gradually disappears, with evolution of spontaneously inflammable phosphuretted hydrogen, which explodes as it reaches the atmosphere with the formation of water

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* The hypophosphites are manufactured in quantity by Hennell Stevens of Philadelphia, who is successfully directing his attention to the supply of new chemicals for medicinal use, and fine chemicals in general.

† *American Journal of Pharmacy*, March, 1858.

and phosphoric acid. When the strong odour of phosphuretted hydrogen ceases to be given off, the liquid contains, besides the excess of lime, nearly half of the phosphorus as phosphate of lime, and the remainder, deducting the considerable portion which has escaped into the air as phosphuretted hydrogen, as hypophosphite of lime. According to Wurtz, more than one equivalent of water is decomposed, and the phosphuretted hydrogen is accompanied by free hydrogen. If this be true, the source of the super-oxidation of so much of the phosphorus is traceable to the resulting oxygen; but Rose is of the opinion that this oxygen is derived from the atmospheric air in contact with the boiling liquid. When the process is conducted in a flask, it requires a constant ebullition of the liquid to prevent the explosion consequent upon the entrance of the atmospheric air. To avoid this result, it has been found safer to employ a deep, open vessel. The constant evolution of gas and vapour which keeps a froth on the surface, excludes the atmosphere in a great degree, so that the yield is not much diminished, whilst the safety and easiness of the process is greatly increased. The process should be conducted under a hood with a strong draught, or in the open air, to avoid the disagreeable fumes which are evolved.

Take of Lime, recently burned, 4℔. av.
Phosphorus, 1℔. av.
Water, 5 gals.

Slake the lime with a gallon of the water, put the remainder in a deep boiler, and as soon as it boils add the slaked lime, and mix to a uniform milk. The phosphorus is now added, and the boiling is kept up constantly, adding hot water from time to time, so as to preserve the measure as nearly as may be, until it is all oxidized and combined, and the strong odour of the gas has disappeared. The mixture froths much, and but little of the phosphorus reaches the surface. Then filter the solution through close muslin, wash out that portion retained by the calcareous residue with water, and evaporate the filtrate till reduced to six pints. The concentrated liquid should now be re-filtered to remove a portion of carbonate of lime which has resulted from the action of the air on the lime in solution, and again evaporated till a pellicle forms, when it may be crystallized by standing in the drying-room, or the heat may be continued with stirring till the salt granulates, when it should be introduced into bottles.

Hypophosphite of lime is a white salt with a pearly margarin-like lustre, and crystallizes in flattened prisms. Its composition, according to Wurtz, is $CaO, + 2HO, PO$, the water being essential to the salt. It is soluble in six parts of cold water, and in not much less of boiling water ; it is soluble slightly in diluted alcohol, but insoluble in alcohol sp. gr. .835.

Hypophosphite of Soda is prepared by double decomposition between hypophosphite of lime and crystallized carbonate of soda.

Take of Hypophosphite of lime, 6 ozs.
Crystallized carbonate of soda, 10 ozs.
Water, a sufficient quantity.

Dissolve the hypophosphite in four pints of water, and the carbonate in a pint and a half, mix the solutions, pour the mixture on a filter, and lixiviate the precipitate of carbonate of lime, after draining, with water, till the filtrate measures six pints. Evaporate this liquid carefully till a pellicle forms, and then stir constantly, continuing the heat till it granulates. In this state the salt is pure enough for medical use, but if desired in crystals, treat the granulated salt with alcohol sp. gr. .835, evaporate the solution till syrupy, and set it by in a warm place to crystallize.

Hypophosphite of soda crystallizes in rectangular tables with a pearly lustre, is quite soluble in water and in ordinary alcohol, and deliquesces when exposed to the air. Its composition is $NO + 2HO,PO$.

Hypophosphite of Potassa is prepared by the same process as that given above for the soda salt, substituting $5\frac{3}{4}$ ounces of granulated *carbonate of potassa* in place of 10 ounces of crystallized carbonate of soda, and using half a pint instead of a pint and a half of water to dissolve it.

Hypophosphite of potassa is a white, opaque, deliquescent salt, very soluble in water and alcohol. Its greater tendency to absorb moisture renders it less eligible for prescription than the soda salt. Its composition is $KO + 2\ HO,PO$.

Hypophosphite of Ammonia is prepared from hypophosphite of lime and sulphate or carbon ate of ammonia.

Take of Hypophosphite of lime, 6 ozs.
Sesqui-carbonate of ammonia (translucent), 7.23 ozs.
Water, a sufficient quantity.

Dissolve the lime salt in four pints of water, and the ammonia salt in two pints of water, mix the solutions, drain the resulting carbonate of lime, and wash out the retained solution with water. The filtrate should then be evaporated carefully to dryness, then dissolved in alcohol, filtered, evaporated, and crystallized.

This salt is deliquescent in the air, very soluble in alcohol and water, and when carefully heated evolves ammonia, and leaves hydrated hypophosphorous acid. The composition of this salt is $NH_3 + 2\,HO, PO$.

Hypophosphite of Sesquioxide of Iron.—This salt may be obtained in the form of a white gelatinous hydrate, by precipitating a solution of hypophosphite of soda or ammonia with one of sesqui-sulphate of iron. The precipitate should be well washed with water, and dried at a moderate temperature. It is necessary to avoid using a hypophosphite containing any alkaline carbonate, or the precipitate will be contaminated with free sesquioxide. Thus prepared, this salt is a white, amorphous, tasteless powder, like the pyrophosphate, soluble in hydrochloric acid, and in free hypophosphorous acid.

Hypophosphorous Acid.—So far as we are aware, this acid has not been employed in a free state by Dr. Churchill, but it is highly probable that it may come into use, should the favourable results claimed for its salts be substantiated by new observations. Any claims which phosphoric acid may possess as an agent to supply the waste of phosphorus and phosphates in the human economy, will be more than equalled by this acid. Hypophosphate of baryta is the salt which is most eligible for the preparation of this acid, but it is more convenient to prepare it from the lime salt, viz. :—

Take of Hypophosphite of lime, 480 grains
Crystallized oxalic acid, 350 grains
Distilled water, 9 fluid ozs.

Dissolve the hypophosphite of lime in six ounces of the water and the acid in the remainder, with the aid of heat, mix the solutions, pour the mixture on a white paper filter, and when the liquid has passed, add distilled water carefully, till it measures ten fluid ounces, and evaporate this to $8\frac{1}{2}$ fluid ounces.

The solution thus prepared contains about ten per cent. of terhydrated hypophosphorous acid ($HO + 2\,HO,PO$), a tea-spoonful representing six grains of the acid, which contains $2\frac{1}{4}$ grains of phosphorus. The dose of this acid solution will probably vary from ten minims to a teaspoonful.

It is proposed to give several forms in which the hypophosphites may be conveniently administered, and a few hints to the physician in reference to prescribing them.

The soluble salts of mercury and silver are reduced by contact with the hypophosphites. All soluble sulphates and carbonates are incompatible with the lime salt, and should not be associated with it in prescriptions, if phosphate of lime is indicated in the case. The iron salt when dissolved by excess of acid, is coloured black by gallotannic acid and drugs containing it, but is not blackened by the tannin of cinchona, catechu, and krameria; hence any preparation containing it may be associated with Peruvian bark. The hypophosphites of soda, potassa and ammonia, are more or less deliquescent, and when prescribed in powder it should be with proper precautions to avoid moisture, as by association with a considerable excess of sugar of milk. The lime salt may be mixed with either this sugar or ordinary sugar. None of these salts are soluble in cod-liver oil, and if given with it, they should be dissolved in syrup, and mixed by agitation. Where lactin and glycerin are indicated in the treatment of phthisis or dyspepsia, any of these salts may be very elegantly associated in the form of syrup.

Syrup of Hypophosphite of Lime.

Take of Hypophosphite of lime, an ounce
Water, nine and a half fluid ounces
White sugar, twelve ounces
Fluid extract of vanilla, half a fluid ounce.

Dissolve the salt in the water, filter, add the sugar, dissolve by aid of heat and add the vanilla. The dose is from a teaspoonful ($3\frac{1}{2}$ grs.) to a tablespoonful (14 grs.), according to the circumstances of the case, three times a day.

Compound Syrup of Hypophosphites.—The following formula has been made in view of the double purpose to which these salts are directed by Dr. Churchill, viz.: the increase of nerve force, and the elevation of the tone of the several functions concerned in alimentation and nutrition, and will afford an agreeable means of testing practically their merit. The iron salt is presented in a form well adapted for entering the circulation, whilst the acid, besides exerting its solvent power, adds to the agreeable taste of the preparation.

Take of Hypophosphite of lime, 256 grains
Hypophosphite of soda, 192 grains
Hypophosphite of potassa, 128 grains
Hypophosphite of iron* (recently precipitated), 96 grains
Hypophosphorous acid solution, q.s. or 240 grains
White sugar, 12 ozs.
Extract of vanilla, ½ oz.
Water, a sufficient quantity.

Dissolve the salts of lime, soda and potassa, in six ounces of water, put the iron salt in a mortar, and gradually add solution of hypophosphorous acid till it is dissolved, to this add the solution of the other salts, after it has been rendered slightly acidulous with the same acid, and then water, till the whole measures nine fluid ounces. Dissolve in this the sugar with heat, and flavour with the vanilla. Without flavouring, this syrup is not unpleasant, being slightly saline, and not at all ferruginous. Any other flavouring may be used, as orange peel, orange flower, or ginger. It is also suggested to physicians that glycerin may be used, wholly or partially, in place of sugar when indicated, six ounces and a half of glycerin being substituted for twelve ounces of sugar. The object of acidulating the saline solution is to decompose any alkaline carbonates which may be present, and which have been noticed by the writer in some of the commercial soda salt. The dose of this preparation is a teaspoonful three or four times a day. A teaspoonful contains 2 grains of the lime salt, 1½ of the soda salt, 1 of the potassa salt, and ¾ of a grain of the iron salt, besides a little hypophosphorous acid.

ON THE EXISTENCE OF AMORPHOUS STARCH IN A NEW TUBERACEOUS FUNGUS.

BY FREDERICK CURREY, ESQ., M.A.

Amorphous starch (including under that term all starch not in the form of the ordinary starch-granule) is rare in the vegetable world. Until the present year Schleiden was the only botanist by whom it had been noticed, and his observations have been doubted by Sanio, Caspary, and Schenk. He (Schleiden) states (*Grundzüge*, i. 181) that he has seen amorphous starch in the form of a thin pasty layer in the cells of the albumen of *Cardamomum minus*, in *Sarsaparilla*, and in the rhizome of *Carex arenaria*. Sanio† has just published the result of some experiments made by him upon the cells of the epidermis of *Gagea lutea*. Upon applying a solution of iodine to these cells, he observed a fine flocculent blue precipitate in their interior. The blue colour was confined to the fluid contents of the cells, the primordial uticle and the nucleus becoming yellow under the iodine.

Another observer, Dr. Schenk,‡ has lately noticed the occurrence of starch in a state of solution in the epidermal cells of the stem, leaves, and other parts of *Ornithogalum nutans* and *Ornithogalum lanceolatum*. These cells were found to contain (besides nuclei) a thick homogeneous fluid. Tincture of iodine coloured the fluid first wine-red, then violet, and finally indigo-blue ; and the fluid at the same time lost its homogeneous nature, and became finely granular and flocculent.

The above mentioned are all cases of phænoganic plants. The Fungi have hitherto been considered wholly devoid of starch, unless perhaps the case mentioned by Schacht § may be an exception. He states that he observed the mycelium of a small mould fungus become clear blue under the action of iodine. He could not,

* This quantity, 96 grains, of hypophosphite of iron is obtained when 128 grains of hypophosphite of soda dissolved in two ounces of water is decomposed with a slight excess of solution of persulphate of iron, and the white precipitate well washed on a filter with water.

† *Bot. Zeitung*, 19th June, 1857.

‡ *Ibid*, July 17th, 1857.

§ *Die Pflanzenzelle*, p. 39

however, ascertain whether the colour was in the membrane or in the contents, and if the former, it is as likely that the colour (being clear blue) arose from the presence of cellulose in a young condition, as from starch.*

Mohl, in his treatise on the vegetable cell, speaks of starch as probably existing in all plants *except the Fungi*. A special interest, therefore, attaches to any plant of the latter tribe, in which starch can be shown to exist, and such a plant has lately come under my observation. The fungus in question, which is interesting not only for its chemical composition, but as constituting a new genus in the family of the Tuberacei, occurred in the spring of the present year, growing gregariously upon fragments of wood on the sands by the sea-shore at Sketty, near Swansea. To the naked eye each individual specimen presents the appearance of a small, round, somewhat flattened body, of a dull yellow colour, and with an unevenness of surface caused by numberless convolutions of the coat of the fungus, which require the aid of a lens in order to be clearly seen. The diameter of the largest specimen does not much exceed the one-eighth of an inch. Externally there is a strong resemblance to small specimens of *Ducrymyces deliquescens*, or perhaps a nearer still to the truffle described by Tulasne, in the "Fungi hypogæi," under the name of *Hydnobolites cerebriformis*. This resemblance, however, is only superficial, as will be seen by the following description of the plant when examined microscopically. The coat of the fungus consists of a convoluted membrane of considerable thickness, formed of several layers of cells, the outer of which are large and rounded, the inner long and flat. In most of the specimens the contents of the coat consist mainly of an innumerable multitude of naked spores ; but in almost all, a careful examination will detect, here and there, isolated sacs or asci containing sporidia ; and a few of the plants, which were in a younger state than the rest, exhibited asci in abundance, showing satisfactorily that the fungus must be classed with the Ascomycetes—not with the Gasteromycetes.

There is no doubt that the asci are absorbed at an early period, and the sporidia then form a dense mass.

It is exceedingly difficult, from the crowded state of the contents, to trace out the manner in which the asci originate ; but I have satisfied myself that they spring at intervals from threads proceeding from the inner surface of the thick external membrane. Fig. 4 represents one of these threads with the asci springing from it, magnified 315 diameters. The asci themselves are broadly clavate, with a very short stem, and are frequently, if not usually, drawn out at the apex into a sort of point, as shown in figs. 2, 3, and 4.

The sporidia are extremely curious. They are globular and colourless, and furnished with long delicate sharp rays projecting from the surface in every direction. Each sporidium is furnished with an internal nucleus, or probably oil-drop (sometimes broken up into several), which varies somewhat in size, and is sometimes in the centre of the globe, sometimes placed eccentrically. Their form will be seen by reference to fig. 5.

The average diameter of the sporidia is about $\frac{1}{2000}$th of an inch. Upon placing a thin section of one of the plants in water under the microscope, and adding a drop of solution of iodine, the sporidia in the course of a few seconds assume a more or less dark purple colour, precisely similar to that produced in starch by the same reagent ; and not only are the sporidia themselves thus affected, but the fluid surrounding them is tinged of an intense purple colour for some distance round the mass of sporidia. This latter colouring is doubtless produced by the effect of the

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* In the *Annales des Sciences Naturelles*, 4th Series, vol. iii., p. 148, Nylander mentions a blue colour being produced by iodine in the summits of the asci of certain *Sphæriæ*, which he attributes to the presence of lichenin. Gerhardt, however, in his *Lehrbuch der Organischen Chemie*, states that a pure solution of lichenin is coloured yellowish by iodine.

It is not easy to understand why the writers who speak of amorphous starch, take no notice of the lichens. Irrespective of the fact that the membrane of the asci of lichens is coloured blue by iodine, it is well known that the asci and paraphyses are often surrounded by a viscid substance, which is coloured by iodine in the same manner as starch, and which cannot well be anything else than starch in an amorphous state. Schacht, indeed, calls the viscid substance "aufgequollene Stärke;" but this expression would be more applicable to the condition of starch when subjected to the action of hot water or sulphuric acid, and seems hardly consistent with his previous definition of the substance as a shapeless, paste-like mass. (See *Die Pflanzenzelle*, pp. 148, 149.)

iodine upon a viscid matter which surrounds the sporidia, and which may either originate in the disintegration of the asci, or may be an independent secretion. There can be little doubt, I think, that this viscid matter is starch in a state of solution. It might be taken for dextrine, but that it differs from that substance in assuming a purple colour under iodine.

The sporidia, although coloured by iodine in the same manner as starch-granules,* do not exhibit any cross when viewed by polarized light. The small size of the Fungi precludes the possibility of procuring a sufficient quantity of the viscid matter, to test its effect upon the plane of polarization.

I find the sporidia unaffected by boiling water, or even by long soaking in sulphuric acid, in which respect they differ from starch-granules. The purple colour, however (as is the case with starch), disappears under the action of heat or of alcohol.

I have named the plant *Amylocarpus encephaloides*, for reasons sufficiently obvious from the above description. Its systematic position is certainly with the Tuberacei, but it has no near allies. The only plant resembling it in structure is *Endogone*, but it is doubtful whether the vesicles of *Endogone* be spores or asci. If the latter, the affinity with *Endogone* would be close.

In conclusion, I may mention, that in a very late number of the *Annales des Sciences Naturelles* (4 série, vol. vi., p. 318), which has reached me since my first observations on the above fungus, M. Tulasne remarks, that in several species of *Erysiphe*, the tips of the radicular appendages are tinged blue by solution of iodine, and that he has observed the same effect produced upon the matter contained in the summits of the asci, and upon the mucous envelope of the sporidia of several species of *Sphæria*. It would seem, therefore, that the absence of starch can no longer be considered as characteristic of the Fungi, and that the existence of that substance in an amorphous state may be considered as satisfactorily proved.—*Proceedings of the Royal Society.*

DESCRIPTION OF THE FIGURES.

Fig. 1. Vertical section of the coat of the Fungus, showing the successive layers of cells, the innermost of which give off threads into the interior of the plant, × 315 diameters.

Figs. 2 and 3. Asci with sporidia, × 415. In fig. 3 the sporidia are only partially matured.

Fig 4. The extremity of a thread, showing the mode of origin of the asci, × 315.

Fig. 5. Free sporidia, × 415.

ON THE CHEMICAL ACTION OF WATER ON SOLUBLE SALTS.

BY DR. J. H. GLADSTONE, F.R.S.

Before extending my researches on chemical affinity among substances in solution, it seemed desirable to ascertain, if possible, what specific chemical action water exerts on a salt. This inquiry is beset with unusual difficulties, and unfortunately my experiments have not led to any conclusive result. Yet some of the observations made during the course of the inquiry have a value independent of theory, and a brief notice of them may not perhaps be deemed unworthy of a place in the *Proceedings of the Royal Society.*

* The blue colour does not extend to the nucleus of the sporidia, which is yellow under the iodine.

It is well known that many anhydrous salts will absorb water, and still remain solid bodies, either amorphous or crystallized. In such a case the water combined is always in simple atomic relation with the salt itself; great heat is often evolved, and a change of colour frequently ensues. These "hydrated" salts (as they are usually considered) are generally soluble in water; and it is the condition of such a body when dissolved that opens a wide field for speculation. The water may act merely as a solvent; or it may unite without decomposition with the dissolved salt, becoming an integral part of the compound in solution; or reciprocal decomposition may ensue, each electro-positive element combining with each electro-negative one in certain proportions; or the ultimate result may be due to two or more of these modes of action in conjunction.

When a "hydrated" salt is dissolved in a minimum of water, nothing is usually observed beyond the new physical properties resulting from the change in its state of aggregation and the absorption of heat. No change of colour, as far as I can find, ever ensues, though a change in the amount of fluorescence may occur. When an anhydrous salt, which will not combine with water to form a solid compound, dissolves, a change of colour does sometimes ensue. Sometimes, however, an evident decomposition takes place, the hydrogen and oxygen of the water combining each with one of the elements of the other binary compound, and the products of this action remaining uncombined. Chloride of bismuth and citrate of ammonia are instances. But in the vast majority of instances, the salt MR and the water HO do not suffer reciprocal decomposition, unless indeed, as has been contended, the resulting MO, HR remain combined together in solution.

If a reciprocal decomposition of this character actually occurs, it may be anticipated by analogy that, by increasing the amount of HO, more MR will be decomposed. Now, if additional water be added to saturated aqueous solutions of pentachloride of antimony, ferric sulphate, ammoniacal nitrate of copper, or nitrate of bismuth, decomposition results, and a precipitate forms proportional within certain limits to the amount of water added; but not one of these is a salt of the simplest constitution. Sometimes, however, a change is rendered apparent in simple salts by a change of colour without the formation of a precipitate.

This was closely examined. It might be expected, *à priori*, that a certain amount of salt would have the same absorbent effect on a given quantity of light, whether it were dissolved in much or little water, and that as the absorbent power of water is practically *nil*, it would appear to the eye of precisely the same depth and character of colour in the two cases. And this actually holds good in the majority of instances; but to prove it a special contrivance was necessary, in order to make the same quantity of light impinge upon the solution before and after dilution. This was effected by means of colourless cylindrical glasses of uniform diameter and the same size, closed at one end with a flat plate of glass, so that when placed upright they could hold liquids: they stood in a case so contrived, that all the light which passed through the strong or diluted solution, as looked through from above, had to enter by the flat plate at the bottom. Every experiment was performed by a comparative method, two glasses being placed side by side, one containing the solution to be diluted, the other a similar quantity of the same solution which served as a standard.

In this manner it was determined that the following salts absorbed the same light, whether dissolved in much or in little water:—

Ferrous Sulphate.
Ferric Nitrate.
Ferric Meconate.
Ferric Comenate.
Ferric Comenamate.
Ferric Gallate.
Nitrate of Nickel.
Nitrate of Cobalt.
Sulphate of Cobalt.
Chloride of Chromium.
Acetate of Chromium.
Chromate of Chromium.
Nitrate of Uranium.
Chloride of Uranium.
Sulphate of Ceric Oxide.

Terchloride of Gold.
Terbromide of Gold.
Protochloride of Platinum (in hydrochloric acid).
Bichloride of Platinum.
Bichloride of Palladium.
Chromate of Potash.
Ferrocyanide of Potassium.
Ferridcyanide of Potassium.
Nitroprusside of Sodium.
Sulphindigotic acid.
Sulphindigotate of Ammonia.
Carbazotate of Copper.
Pentasulphide of Potassium.

The following salts were affected in regard to their absorption of light, by adding water to their saturated solutions :—

Salt.	Saturated solution.	Dilute solution.
Ferric Acetate.	Red.	Darker.
Ferric Tartrate.	Red.	Slightly paler.
Ferric Chloride.	Orange-red.	Orange-yellow.
Ferric Citrate.	Red.	Orange and paler.
Ferric Sulphocyanide.	Intense red.	Orange.
Chloride of Nickel.	Yellowish green.	Bluish green.
Iodide of Nickel.	Deep green.	Paler blue-green.
Chloride of Cobalt.	Red.	Paler and less pure.
Iodide of Cobalt.	Deep green.	Pale red.
Acetate of Cobalt.	Red.	Paler and more orange.
Sulphocyanide of Cobalt.	Intense purple.	Pale red.
Chloride of Copper.	Green.	Blue.
Bromide of Copper.	Green.	Blue.
Acetate of Copper.	Greenish blue.	Paler and purer blue.
Permanganate of Potash.	Purple.	Paler and redder.
Chromic acid,	Red,	Orange.

That these changes of colour are due to the action of the water, and not to any merely physical cause, is proved by the fact that alcohol does not occasion them. Quantitative experiments were instituted with acetate of copper and sulphocyanide of iron, to determine whether the effect of successive additions of water is in a decreasing ratio. It was found to be so on the whole, but the results showed certain irregularities that do not usually occur in cases of reciprocal decomposition, where the mass of one of the compounds is successively increased.

A prismatic examination of the rays absorbed by these salts in different states of solution revealed two very suggestive facts. The one is, that in every case (except ferric acetate) the salt in dilute solution not only transmits every ray that was transmitted by it in saturated solution, but also some rays which it then absorbed. The other is, that strong solutions of the chlorides, bromides, and iodides of copper, cobalt, nickel, and iron—analogous metals—exhibit not only the absorption due to the respective bases, but another absorption which can be identified with that produced by the halogens themselves when simply dissolved in water ; while, when these solutions are diluted, they cease to produce this second absorption, and give precisely the same prismatic image as any compound of the same base with a colourless acid. The amount of water required to effect this change depends on the temperature. That the phenomena indicate some difference of arrangement among the elements of the dissolved salt and the water, cannot, I think, be doubted, but they fail to show in any distinct manner what that difference is.

The action of water on double salts is a still more complicated problem ; but the question as to whether water separates the two components, did not prove so difficult of decision. While on the one hand the physical properties of many double salts, as for instance the potassio-chloride or iodide of platinum, prove that they are not decomposed by water, the experiments of Graham, on the other hand, show that some salts, as for instance alum, suffer at least a partial decomposition in diffusion.

The iodide of mercury and potassium, and the sulphocyanide of silver and potassium, dissolve in a small quantity of water, but the addition of more causes the separation of the insoluble component. The double sulphates of copper, nickel, or chromium with potash, the sulphate of copper and ammonia, the chloride of platinum and potassium, the iodides of platinum or gold with potassium, and the hydrochlorate of chloride of gold, do not change in colour on the dilution of their aqueous solutions ; but this does not prove that no separation has taken place, for the colour of these double salts in solution is precisely that of an equivalent amount

of that component to which the colour is due. But bichlorate of potash and bicomenamate of iron likewise exhibit no change of colour on dilution, though such must ensue, if they be converted into neutral salt and free acid. On the other hand, the red potassio-oxalate of chromium varies in intensity of colour on the addition of water, and the different double chlorides of copper undergo the same change as the simple salt. If hydrochlorate of terchloride of gold be added to the terbromide of that metal, a reduction in colour ensues, and an analogous result is obtained when the double sulphate of copper and potash acts on the acetate of copper—facts which point to a decomposition of the double salt in solution. Indeed, it is evident that some double salts are resolved more or less into their components by water, while others are not so affected.

The general tendency of my observations has led me to the opinion, that water does not act upon a salt dissolved in it in a manner analogous to that of the hydracids, but I hesitate to draw any conclusion as to the rational constitution of a dissolved salt.—*Proceedings of the Royal Society.*

ON THE INFLUENCE OF MUSICAL SOUNDS ON THE FLAME OF A JET OF COAL-GAS.

BY JOHN LECONTE, M.D.

A SHORT time after reading Prof. John Tyndall's excellent article "On the Sounds produced by the Combustion of Gases in Tubes,"* I happened to be one of a party of eight persons assembled after tea for the purpose of enjoying a private musical entertainment. Three instruments were employed in the performance of several of the grand trios of Beethoven—namely, the piano, violin, and violoncello. Two "*fish-tail*" gas-burners projected from the brick wall near the piano. Both of them burnt with remarkable steadiness, the windows being closed and the air of the room being very calm. Nevertheless it was evident that *one* of them was under a pressure nearly sufficient to make it *flare*.

Soon after the music commenced, I observed that the flame of the last-mentioned burner exhibited pulsations in height which were *exactly synchronous* with the audible beats. This phenomenon was very striking to every one in the room, and especially so when the strong notes of the violencello came in. It was exceedingly interesting to observe how perfectly even the *trills* of this instrument were reflected on the sheet of flame. *A deaf man might have seen the harmony.* As the evening advanced, and the diminished consumption of gas in the city *increased the pressure*, the phenomenon became more conspicuous. The *jumping* of the flame gradually increased, became somewhat irregular, and finally it began to flare continuously, emitting the characteristic sound, indicating the escape of a greater amount of gas than could be properly consumed. I then ascertained by experiment, that the phenomenon *did not* take place unless the discharge of gas was so regulated that the flame approximated the condition of *flaring*. I likewise determined by experiment, that the effects *were not* produced by jarring or shaking the floor and walls of the room by means of repeated concussions. Hence it is obvious that the pulsations of the flame *were not* owing to *indirect* vibrations propagated through the medium of the walls of the room to the burning apparatus, but must have been produced by the *direct* influence of the aërial sonorous pulses on the burning jet.

In the experiments of M. Schaffgotsch and Prof. J. Tyndall, it is evident that "the shaking of the singing flame within the glass tube," produced by the voice or the syrene, was a phenomenon perfectly analogous to what took place under my observation *without the intervention of a tube.* In my case, the discharge of gas was so regulated, that there was a tendency in the flame to flare, or to emit a "*singing sound.*" Under these circumstances, strong aërial pulsations occurring at *regular intervals* were sufficient to develop synchronous fluctuations in the height of the flame. It is probable that the effects would be more striking when the tones of the musical instrument are *nearly* in unison with the sounds which would be produced by the flame under the slight increase in the rapidity of discharge of gas required to manifest the phenomenon of flaring. This point might be submitted to an experimental test.

As in Prof. Tyndall's experiments on the jet of gas burning within a tube,

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* *Phil. Mag.*, S. 4, vol. xiii., p. 473, 1857.

clapping of the hands, shouting, &c., were ineffectual in converting the "silent" into the "singing flame," so in the case under consideration, *irregular* sounds did not produce any perceptible influence. It seems to be necessary that the impulses should *accumulate*, in order to exercise an appreciable effect.

With regard to the mode in which the sounds are produced by the combustion of gases in tubes, it is universally admitted that the explanation given by Prof. Faraday in 1818 is essentially correct. It is well known that he referred these sounds to the successive explosions produced by the periodic combination of the atmospheric oxygen with the issuing jet of gas. While reading Prof. J. Plateau's admirable researches (third series) on the "Theory of the Modifications experienced by Jets of Liquid issuing from Circular Orifices when exposed to the Influence of Vibratory Motions,"* the idea flashed across my mind that the phenomenon which had fallen under my observation was nothing more than a *particular case* of the effects of sounds on *all kinds of fluid jets*. Subsequent reflection has only served to fortify this first impression.

The beautiful investigations of Felix Savart on the influence of sounds on jets of water, afford results presenting so many points of analogy with their effects on the jet of burning gas, that it may be well to inquire whether both of them may be referred to a common cause. In order to place this in a striking light, I shall subjoin some of the results of Savart's experiments. Vertically descending jets of water receive the following modifications under the influence of vibrations :—

1. The continuous portions become shortened ; the vein resolves itself into separate drops, nearer the orifice than when *not* under the influence of vibrations.

2. Each of the masses, as they detach themselves from the extremity of the continuous part, becomes flattened alternately in a vertical and horizontal direction, presenting to the eye, under the influence of their translatory motion, regularly disposed series of maxima and minima of thickness, or ventral segments and nodes.

3. The foregoing modifications become much more developed and regular when a note, in unison with that which would be produced by the shock of the discontinuous part of the jet against a stretched membrane, is sounded in its neighbourhood. The continuous part becomes considerably shortened, and the ventral segments are enlarged.

4. When the note of the instrument is *almost* in unison, the continuous part of the jet is alternately lengthened and shortened, and the beats which coincide with these variations in length *can be recognized by the ear*.

5. Other tones act with less energy on the jet, and some produce no sensible effect.

When a jet is made to ascend *obliquely*, so that the discontinuous part appears scattered into a kind of *sheaf* in the same vertical plane, M. Savart found—

a. That under the influence of vibrations of a determinate period, this sheaf may form itself into *two* distinct jets, each possessing regularly disposed ventral segments and nodes ; sometimes, with a different note, the sheaf becomes replaced by *three* jets.

b. The note which produces the greatest shortening of the continuous part, always reduces the whole to a *single* jet, presenting a perfectly regular system of ventral segments and nodes.

In the last memoir of M. Savart—a posthumous one, presented to the Academy of Sciences of Paris by M. Arago in 1853†—several remarkable acoustic phenomena are noticed in relation to the musical tones produced by the efflux of liquids through short tubes. When certain precautions and conditions are observed (which are minutely detailed by this able experimentalist), the discharge of the liquid gives rise to a succession of musical tones of great intensity and of a peculiar quality, somewhat analogous to that of the human voice. That these notes were not produced by the descending drops of the liquid vein, was proved by permitting it to discharge itself into a vessel of water, while the orifice was below the surface of the latter. In this case the jet of liquid must have been *continuous*, but nevertheless the notes were produced. These unexpected results have been entirely confirmed by the more recent experiments of Prof. Tyndall.‡

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* *Phil. Mag.*, S. 4, vol. xiv., p. 1 *et seq.*, July, 1857.
† *Comptes Rendus* for August, 1853. Also *Phil. Mag.*, S. 4, vol. vii., p. 186, 1854.
‡ *Phil. Mag.*, S. 4, vol. viii., p. 74, 1854.

According to the researches of M. Plateau, all the phenomena of the influence of vibrations on jets of liquid are referable to the conflict between the vibrations and the *forces of figure* ("*forces figuratrices*"). If the physical fact is admitted—and it seems to be indisputable—that a liquid cylinder attains a *limit of stability* when the proportion between its length and its diameter is in the ratio of 22 to 7, it is almost a *physical necessity* that the jet should assume the constitution indicated by the observations of Savart. It likewise seems highly probable that a liquid jet, while in a transition stage to discontinuous drops, should be exceedingly sensitive to the influence of all kinds of vibrations. It must be confessed, however, that Plateau's beautiful and coherent theory does not appear to embrace Savart's last experiment, in which the musical tones were produced by a jet of water issuing under the surface of the same liquid. It is rather difficult to imagine what agency the "forces of figure" could have, under such circumstances, in the production of the phenomenon. This curious experiment tends to corroborate Savart's original idea, that the vibrations which produce the sounds must take place in the glass reservoir itself, and that the cause must be inherent in the phenomenon of the flow.

To apply the principles of Plateau's theory to gaseous jets, we are compelled to abandon the idea of the *non-existence of molecular cohesion in gases.* But is there not abundant evidence to show that cohesion *does exist* among the particles of gaseous masses? Does not the deviation from rigorous accuracy, both in the law of Mariotte and of Gay-Lussac—especially in the case of condensable gases, as shown by the admirable experiments of M. Regnault—clearly prove that the hypothesis of the non-existence of cohesion in aëriform bodies is fallacious? Do not the expanding rings which ascend when a bubble of phosphuretted hydrogen takes fire in the air, indicate the existence of some cohesive force in the gaseous product of combustion (aqueous vapour), whose outlines are marked by the opaque phosphoric acid? In short, does not the very *form* of the flame of a "fish-tail" burner demonstrate that cohesion *must exist* among the particles of the issuing gas? It is well known that in this burner the single jet which issues is formed by the union of *two oblique jets* immediately before the gas is emitted. The result is a perpendicular *sheet of flame.* How is such a result produced by the mutual action of two jets, unless the force of cohesion is brought into play? Is it not obvious that such a fan-like flame must be produced by the same causes as those varied and beautiful forms of aqueous sheets developed by the mutual action of jets of water, so strikingly exhibited in the experiments of Savart and of Magnus?

If it be granted that gases possess molecular cohesion, it seems to be physically certain that jets of gas must be subject to the same laws as those of liquid. Vibratory movements excited in the neighbourhood, ought therefore to produce modifications in them analogous to those recorded by M. Savart in relation to jets of water. Flame or incandescent gas presents gaseous matter in a *visible* form, admirably adapted for experimental investigation: and *when produced by a jet,* should be amenable to the principles of Plateau's theory. According to this view, the pulsations or *beats* which I observed in the gas-flame when under the influence of musical sounds, are produced by the conflict between the aërial vibrations and the "forces of figure" (as Plateau calls them), giving origin to periodical fluctuations of intensity, depending on the sonorous pulses.

If this view is correct, will it not be necessary for us to modify our ideas in relation to the agency of tubes in developing musical sounds by means of burning jets of gas? Must we not look upon all burning jets—as in the case of water-jets—as *musically inclined;* and that the use of tubes merely places them in a condition favourable for developing the tones? It is well known that burning jets frequently emit a *singing sound* when they are perfectly *free.* Are these sounds produced by successive explosions analogous to those which take place in glass tubes? It is very certain, that under the influence of molecular forces, any cause which tends to elongate the flame, without affecting the velocity of discharge, must tend to render it discontinuous, and thus bring about that mixture of gas and air which is essential to the production of the explosions. The influence of tubes, as well as of aërial vibrations, in establishing this condition of things, is sufficiently obvious. Was not the "beaded line," with its succession of "luminous stars," which Prof. Tyndall observed when a flame of olefiant gas burning in a tube was examined by means of a moving mirror, an indication that the flame became *discontinuous,* precisely as the continuous part of a jet of water becomes *shortened,* and resolved into isolated drops,

under the influence of sonorous pulsations? But I forbear enlarging on this very interesting subject, inasmuch as the accomplished physicist last named has promised to examine it at a future period. In the hands of so sagacious a philosopher, we may anticipate a most searching investigation of the phenomena in all their relations. In the mean time I wish to call the attention of men of science to the view presented in this article, in so far as it groups together several classes of phenomena under one head, and may be considered a partial generalization.—From *Silliman's American Journal* for January, 1858.

THE PRODUCTION OF ALUMINIUM.

M. Petitjean, a French Chemist, resident in London (the inventor of an admirable method of silvering mirrors cheaply, which was brought to the notice of the Royal Institution some time since by Professor Faraday), has effected an improvement in the production of aluminium, which promises to still further reduce the cost of that valuable metal beyond all that has hitherto been anticipated. His invention consists in transforming so much of the aluminium as is present in the substances with which it is found naturally combined into one or more sulphurets; and then removing the sulphur therefrom by the aid of carbon, or a hydrocarbon, or of a suitable metal or metals, mixed therewith, and exposed in a crucible to a high temperature, after which the aluminium in a metallic state will be deposited in the crucible. The process is equally applicable to the production of magnesium.

Sir F. C. Knowles, Bart., has also taken out a valuable patent for the manufacture of aluminium. His invention consists of a method of preparing the cyanides of potassium and of sodium, and in the use of those cyanides in the making of the aluminium. To form the cyanides the patentee combines anhydrous carbonate of potash or anhydrous carbonate of soda, as the case may be, with fine charcoal, in such a proportion as to convert the carbonic acid into carbonic oxide by the action of heat, and to decompose the alkali used. He places this mixture in a chamber with lumps of charcoal, such chamber being of fire-clay, fire-brick, or iron; and then, having heated the same sufficiently, he passes through it a current of the waste gases of blast furnaces used in smelting iron ores, or of the same or similar gases obtained intentionally from a cupola by a blast of air. The nitrogen contained in these gases combines with the charcoal to form cyanogen, and this, uniting with the metallic base of the decomposed alkali, forms a vapour of the cyanide required, which can be collected by sublimation in appropriate chambers and cooled. To make the metal aluminium, he takes one or other of the above cyanides and the chloride of aluminium, and by passing the vapour of the chloride of aluminium through, or otherwise combining the same in the form of melted chloride, or its vapour, with the melted cyanides or their vapour, he obtains, by double decomposition, chloride of sodium or chloride of potassium and the metal aluminium, which can be readily collected and fused. Pure alumina may be added to the materials to increase the yield of metal and to economize the cyanide, and this he recommends to be done in most cases.—*Mechanics' Magazine.*

THE SANITARY CONDITION OF STABLES.

During the month, forty-seven inhabited stables have been improved in their sanitary condition: sixteen of these have been supplied with new closets, of which they were previously destitute; twenty-four have been drained, most of them having no means whatever of carrying off the fluid soil. Such stables have usually a cess-pool in the stall in which the soil stands, evaporates, escapes by overflow—as the case may be—or sinks into the interstices of the pavement on which the horses stand. The result of this horrible arrangement is, that the sulphates of the soil become deoxidized by the animal matter; sulphuretted hydrogen—one of the most poisonous of gases—is generated, and carrying with it other exhalations, mixes with the air breathed by the poor animals, and makes its way into the apartments above, occupied by the still more unfortunate servants. Stables which are painted, speedily have the surface of the pigment completely blackened by the union of the sulphur of the gas with the metal of the white lead. This unhealthy condition is sufficient to account for the fatal form which scarlatina, measles, and hooping-cough assume when they attack children inhabiting mews. It is to similar emanations from sewage soaking into the lower levels that we must ascribe much of the aggravation of epidemics, of diarrhœa, and cholera, which has been demonstrated to be in the

direct ratio of proximity to the Thames. Sulphuretted hydrogen, derived from imperfect and untrapped drains in areas and cellars, may be observed to attack the painted fronts of many houses in this parish where oil paint has been employed.—*From Dr. Thomson's Monthly Report*, March, 1856.

MEDICAL REFORM.—SALE OF POISONS.

Lord Talbot de Malahide, in rising to ask the First Lord of the Treasury what were the intentions of her Majesty's Government with respect to medical reform, and the regulation of the trade in poisons, said that the question of medical reform was one of great importance and anxiety to a large class of the community. The medical profession were now better prepared for legislation on this subject than they had been for many years. The chief objects which this noble profession desired were — first, the introduction of uniformity in the test of the different branches of the medical profession, so that those gentlemen whose studies and attainments placed them on an equal level might occupy the same favourable position ; secondly, that there should be no artificial difficulty to prevent a person of talent and experience from attaining the highest status in his profession ; and, thirdly, that the Legislature should guard against the intrusion of incompetent men into the profession, and protect the public against the evil of quacks and impostors. Last session two Bills on medical reform were brought into the other House, but neither obtained the sanction of the Government. Two Bills were now in contemplation by independent members of the other House, but unless those Bills obtained the concurrence and assistance of the Government, there was but little chance of their passing. With respect to the sale of poisons, a committee of their lordships' House sat last session and took a good deal of evidence, which established the necessity for legislation. He was aware that a difference of opinion existed on this subject, but he thought that it deserved the attention of her Majesty's Government.

The Earl of Derby said that the noble lord had very properly brought under their lordships' attention two subjects of importance, to which the noble lord had, he knew, given much attention. At the same time he must remind him that there was a certain class of cases, with regard to which they were all agreed that something ought to be done ; but when they came to consider the details of a measure, very few agreed upon what ought to be done. There was no stronger exemplification of the truth of this remark, than was afforded by the question of medical reform ; for the members of the medical profession were not altogether agreed upon what was wanted, and their disagreement rendered it almost impossible to pass any satisfactory measure. He might mention as an analogous case, that when he was a member of the House of Commons, he hardly recollected one year in which some member—generally a young and enthusiastic member—did not bring in a bill for the reform of the laws regulating the salmon fishery. They were always told that there was a necessity for immediate legislation on the subject, and Parliament was induced to interfere ; but as surely as a bill was passed in one session, another had to be passed in the next to amend it. Now, he feared that this was very much the case with regard to medical reform. The law as it stood was certainly not creditable to the country, and therefore he thought something ought to be done. The noble lord had not, however, done justice to the efforts which had been made in the House of Commons to amend the law. It was true that last year two bills were introduced, but this year so great was the excitement on the subject, that no fewer than three bills had been brought into the other House by three different members. Amid such a conflict of opinion he was not prepared to say that the Government were ready to enter into the lists and bring forward a fourth bill on their own responsibility; but, considering the intimate acquaintance with the subject possessed by those three gentlemen, it was the intention of his colleagues in the other House to give their best attention to the bills which had been introduced, and to endeavour, by some amicable arrangement with the different parties, to frame such a measure as would be most generally approved, and as would meet the views of the profession at large. As to the sale of poisons, the noble lord was aware that a bill was introduced on that subject last year by his noble friend the late President of the Council. That bill was sent to a committee which suggested several amendments, and he (Lord Derby) had lately communicated with his right hon. friend the Secretary for the Home Department, calling his attention to the bill so amended, and requesting him to communicate more especially with the

Pharmaceutical Society on the subject. If it was found that there was any chance of a bill being so framed as to receive the approbation of Parliament, it would be introduced into the other House.

POISONING BY ACETATE OF LEAD.

A CASE was admitted last week, under Dr. Leared's care, in which self-destruction by acetate of lead was attempted. A healthy young man took before breakfast two pennyworth of the salt in half a tumbler of water. He was careful to swallow the portion remaining undissolved. In about a quarter of an hour he vomited. He had now some epigastric and frontal pain, severe abdominal pain ensued, and in about three-quarters of an hour from the time of swallowing the acetate he was purged once freely. Two hours subsequently he was brought to the hospital. The only thing he then complained of was the abdominal pain. The pulse presented nothing remarkable. He was immediately given sulphate of zinc as an emetic. The next day sulphate of magnesia was given, as the bowels were constipated. He was discharged well on the day following.

It was ascertained from the Chemist from whom it was procured, that one ounce of acetate of lead is sold by him for twopence.

Dr. Leared remarked that the case was interesting, as affording additional evidence of the comparative harmlessness of the acetate of lead, although popularly regarded as an active poison; also the purgative action of an astringent salt, owing to the largeness of the dose, was instructive.—*Chemical Times and Gazette*, March 20.

POISONING BY OPIUM.

ON Tuesday, March 16th, a coroner's inquest was held at New Brighton, a watering-place on the Cheshire side of the Mersey, upon the body of Mr. Thomas Tattersall, corn merchant, of Liverpool. It appeared that the deceased went over to the Marine Hotel, New Brighton, on Saturday evening week, taking with him a prescription from a medical gentleman in Liverpool. This he had made up at New Brighton, and the Chemist, who prepared the prescription with great care, marked the bottle to show the quantity to be taken, which was one-fourth of the whole. Although the deceased made no particular complaint of being unwell, he had a fire put into his room, and retired to rest about eleven o'clock at night. The landlord of the hotel went to his room next morning, and found him very ill—quite unconscious. He immediately sent for medical assistance, but the unfortunate gentleman, who had taken three-fourths instead of one-fourth of the medicine, died in about an hour. There were none of his friends present during the inquest, for which the jury censured them, they having had ample notice. The jury, by the direction of the coroner, found a verdict of "Died from an overdose of the sedative liquor of opium." —*Observer*, March 21.

POISONING BY CYANIDE OF POTASSIUM.

ON Friday, March 19th, information was received by Mr. Carter, coroner for East Surrey, of the following distressing circumstance, which ought to act as a caution to photographic artists. It appeared that Mr. Jenkin Joel, draper and straw bonnet maker, of Mount Street, Westminster Road, opened the window of the bonnet warehouse the previous day to air it. This room adjoins the glass or portrait-taking room of Mr. Kirby, the photographic artist; and shortly after the window had been opened, Samuel, a son of Mr. Joel, entered the room, and, unperceived, laid hold of a small jug containing a chemical preparation for bringing up the colours of portraits, and drank a portion of the contents. Another son of Mr. Joel came in at the moment, and seeing the child with the jug in his hand and writhing with pain, gave an alarm. Three medical men were sent for, and promptly attended, but owing to the deadly nature of the preparation, no relief could be afforded, and the unfortunate child expired in about seven minutes after drinking the mixture.—*Observer*, Mar. 21.

DEATH FROM WORM LOZENGES.

A CORONER'S inquest was held March 3rd, at the Brunswick Hotel, on the body of Sarah Jane Harris, a girl eleven years of age, who came by her death under the following distressing circumstances :—The child was troubled with worms, and her father, who is a metal melter, took her to the shop of Henry Jenkins, confectioner,

Dean Street, Newcastle, and obtained a pennyworth of worm lozenges. This was on Tuesday, the 16th of February. That evening the child had one of the lozenges given her, a second on the 18th, a third on the 19th, and a fourth on the 20th. By this time the poor thing had become very ill, and the Dispensary surgeon, Jonathan Dickenson, Esq., was called in, and he found her in a high state of salivation. He treated her from that time to the 1st instant, when she died. The bereaved father was advised to go to Jenkins's shop and purchase another pennyworth of the lozenges, which he did ; and on their being subjected to a chemical analysis, on eof them is found to contain five grains of calomel, and another three grains. After hearing the whole of the evidence, of which this is the sum, the jury returned the following verdict:—"We are of opinion that Sarah Jane Harris came to her death on the 1st of March, 1858, by salivation, produced by taking four worm lozenges, purchased at the shop of Henry Jenkins, confectioner, of Dean Street, Newcastle ; and we are further satisfied by the evidence, that there is great and dangerous irregularity in the mixing of the said lozenges."—*The Northern Daily Express*, March 4.

Mr. Jenkins and the maker of the lozenges, in a letter to the *Gateshead Observer*, state that Mr. Dickenson was mistaken in saying that one of the lozenges contained five grains, and another three grains of calomel ; and they will guarantee them to contain only one grain of calomel in each lozenge, and will submit them to any person for analysis.

SUBSTITUTE FOR LARD IN OINTMENTS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—The suggestion of the correspondent in your last number, on glycerine and fuller's earth as a substitute for lard in ointments, is well worthy of investigation. The application of ointments to diseased parts, according to the formulæ of the present Pharmacopœia, is always attended with an inconvenience, on account of lard being the basis, which being insoluble in water, it cannot be removed without the application of soap; and that, on account of the caustic alkali it contains, renders it objectionable and noxious to irritable parts.

If glycerine is made the basis of ointments, it appears to me to be only available for surgeons, or those who have a large dispensing establishment, as the cost of the glycerine would be far too great to retail it to the public at the present rate of prices for the every day useful ointments. I have tried a few experiments, the results of which are favourable, as follows :—

Having the fuller's earth in fine powder, I proceed—

℞ Fuller's Earth, ℥ss.
Oil Almonds, ʒij.
Water, ʒij.
Glycerine, ʒj.

This makes a perfectly smooth paste, in which other ingredients are perfectly miscible. Again—

℞ Fuller's Earth.
Glycerine.
Oil Almonds, āā ʒj.

This does not make such a smooth paste as the former. A third is—

℞ Fuller's Earth, ℥ss.
Ol. Palmæ, ʒij.

This, on account of the rich colour of the oil, forms, when mixed, a perfect yellow paste of good consistence ; but if the oil were bleached, I think it would make an elegant preparation. The emollient qualities of the palm oil are too well known to need further comment.

Newton, March 16, 1858. H. Seymour.

BOOKS RECEIVED.

A Dictionary of Trade Products, Commercial, Manufacturing, and Technical Terms ; *with a definition of the Moneys, Weights, and Measures of all Countries, reduced to the British Standard.* By P. L. Simmonds, F.R.G.S., F.S.S., &c. London: G. Routledge & Co., Farringdon St. 8vo, pp. 422. 1858. (From the Publishers.)

A Catechism on Chemistry, including Heat, Magnetism, and Electricity ; *arranged chiefly with reference to the new Army and other Examinations.* By the Rev.

J. W. Neat, M.A., of Corpus Christi College, Cambridge. London : Longman, Brown, Green, Longmans, and Roberts. 1858.

The Trocar (to be published occasionally). No. 4.

This is a Dental periodical, emanating from some of the supporters of the late College of Dentists, which it appears to be their desire to perpetuate, instead of joining in the general amalgamation of the Dental profession.

TO CORRESPONDENTS.

M. P. S. (Guildford).—(1.) The sale of homœopathic medicines would not interfere with the legal rights or qualification of a Pharmaceutical Chemist.—(2.) *Classical Examination.* See page 488 of our last number.—(3.) Yes.

W. H. (Birmingham) should give his name and address, for the information to be sent by post.

[The letters of the above correspondents were mislaid, or they would have been answered last month.]

H. H. K. (London).—*Unguentum Sulphuris Hypochloridi Compositum.* Vol. x., p. 66.

M. P. S. (Cambridge).—The mixture, made according to the formula mentioned, should be opaque.

R. G. M. (Manchester).—*Quassia Amara* is most probably intended.

J. P. W. (Hampstead).—A variety of formulæ for writing inks will be found in the twelfth volume of this journal.

A Registered Apprentice (Worcester).—*Selecta è Prescriptis*, 5*s.*; *Pharmaceutical Latin Grammar*, 5*s.*; *Pharmacopœia*, 5*s.*; Balfour's *Outlines of Botany*, 7*s.* 6*d.* Candidates for registration as Associates are required to pass the Minor Examination.

Enquirer (Rochdale).—*Tinctura Aurantii.*

S. H. W. (Tenterden).—The new alkaloid alluded to is said to be known to the proprietor only.

J. R. (Halifax) has sent the following:—"If a lock of gun-cotton be laid in the palm of the hand, and struck once or twice with the other hand, it becomes highly electric, will exhibit all the ordinary electrical phenomena observed with glass, resin, &c., gives a strong spark, and may even be made to charge a small jar. I use it in preference to silk as an excitant."

[This property of gun-cotton was first noticed by Mr. Bowman, of King's College, and was published in the *Philosophical Magazine* in 1846; and a paper by Mr. J. Fordred, on the same subject, was published in this Journal, vol. vi., page 318.]

M. P. S. (Newcastle-upon-Tyne).—The sale of essence of peppermint for making cordials is not prohibited.

F. H. C. (Southport).—We know of no better mineral red show-colour than that made from oxide of cobalt. See vol. iii., p. 341.

A Member (Liverpool).—The communication being anonymous, cannot receive official attention.

A Correspondent (Brighton), in answer to *T. S.* (Norwich), sends the following:—*To Tin Cast-iron*—"If the surface is small make it perfectly bright by filing; moisten with a solution of zinc in hydrochloric acid, and apply tin with a copper bit, or dip the article into tin melted in an iron ladle. Be careful not to let it get red-hot."

A Member.—Pereira's *Materia Medica.*

Chemicus (Bath).—(1.) *Syrupus Ferri Superphosphatis*, vol. xii., p. 311.—(2.) We have no formula for Syrupus Zinci Superphosphatis.

W. K. (Tamworth).—We are unable to give the information.

Z. R. H. (Stroud).—Dissolve teroxide or terchloride of gold in a solution of pyrophosphate of soda, and dip the article to be gilt in it.

M. P. S.—The verses are not adapted to this Journal.

"*Isca*" (Exeter).—(1.) The deposit is probably occasioned by the tannin in the orange-peel.—(2.) We can add nothing to what has already appeared in this Journal on the subject.—(3.) Yes.

Erratum.—Page 445, line 1, *for* January 16, *read* February 16.

Instructions from Members and Associates, respecting the transmission of the Journal, to the Secretary, 17, Bloomsbury Square, before the 20th of the month.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XVII.—No. XI.—MAY 1st, 1858.

THE BUSINESS OF THE ANNUAL MEETING OF THE PHARMACEUTICAL SOCIETY.

In anticipation of the usual meeting of the Members in the month of May, a few remarks on the business to be transacted will not be out of place. The ordinary business on such occasions is the reception of the report of the Council, and the election of Council and Auditors for the ensuing year. The discussion arising on the Report affords the opportunity of directing special attention to any of the subjects comprised in it, and offering such suggestions as may be thought desirable. It has sometimes occurred that a difference of opinion has existed in reference to the regulations or management of the Society, and the anniversary is the proper occasion for the discussion of these questions. While a society is in its infancy, and its course of action is not fully matured, it is scarcely to be expected that the Members will be unanimous as to the best mode of carrying out the objects in view; and until the proceedings have settled down into regular order, as the result of experience, some clashing of opinion and warmth of debate on various points may be expected. This should not be regarded as an unfavourable symptom, as it denotes a general interest in the concerns of the Institution, and a disposition to take an active part in its proceedings.

The Pharmaceutical Society has had its share of difficulties to contend with, and at some of the annual meetings the retiring Council have been called upon to defend the policy they had thought it right to adopt, as well as to explain various matters on which misapprehension appeared to exist. The election of the Council for the ensuing year has sometimes been attended with considerable interest and excitement, on account of the number of fresh nominations. On the present occasion no contest will take place, the numbers proposed being only sufficient to fill up the vacancies. According to the Bye-Laws of the Society, any Member desirous of nominating another for election as a Member of Council or an Auditor, must give notice in writing to the Secretary before the 25th day of March, and the Members are invariably reminded of the date by the publication of this Bye-Law in the previous number of the Transactions. In the event of a sufficient number not being nominated, it devolves on the Council to complete the list of fourteen candidates (the number to be elected) at their meeting in April. Only five having been nominated in the regular way this year, three of whom are now in office, it may be inferred that the Members generally have confidence in the present Council. However satisfactory it may be to the parties concerned to draw this inference, it is not desirable, as a general rule, that the Members should neglect or disregard the privilege which they enjoy under the Charter of electing their representatives, nor should it be supposed, because there will not be a contested election on the present occasion, that there is, on this account, no object in attending the meeting. Several subjects will be referred to in the Annual Report on which the opinion of the Members is particularly desired. It is also of great importance at the present time that the Society should maintain its ground, and evince a disposition to take cognizance of any contemplated legislation with reference to Pharmacy, giving such assistance as the practical experience of its members

may enable them to afford, and at the same time opposing any objectionable or obnoxious measures which may be brought forward, founded on the mistaken theoretical notions of inexperienced persons. The Council endeavour to represent fairly and honestly the opinions and interests of the Members in dealing with the various questions which come under their notice; but they may reasonable expect on the part of the Members a full and candid expression of opinion on those occasions when periodical meetings afford the opportunity for discussion. The pressure from without is often required to strengthen the hands of a Minister or Member of Parliament in carrying a Bill through the House, and the support of the Members is no less necessary to enable the Council of the Society to uphold successfully the principles on which the stability and character of the profession depend. Some questions may be expected shortly to arise on which it will be necessary for the Society to maintain its ground, and resist the endeavours which have been made, and are not unlikely to be repeated, to divert into another channel the authority and responsibility of regulating the affairs of the Pharmaceutical Profession. For this especial purpose the Society was established, and the success of its efforts will depend on the concentration of its influence, and the energy with which the Members support the Council in the performance of the duties of office. It must not be supposed, because the affairs of the Society appear to be in a prosperous condition, that the Members have no occasion to trouble themselves to attend a meeting or to inquire into its proceedings. A delusion so fallacious would be fatal to the interests of any institution, causing it to subside into an unhealthy state of lethargy.

THE REFINEMENTS OF CHEMICAL AND BOTANICAL SCIENCE.

In our correspondence with students respecting the nature of the education required to qualify a person as a Pharmaceutical Chemist, the enquiry is frequently made, To what extent is it necessary to pursue the intricacies of abstract science? This question is not very easily answered. An elementary knowledge of Chemistry and Botany, and a general acquaintance with the materials and products used in medicine, are necessary to enable the Pharmaceutical Chemist safely to perform his duties as a vendor and dispenser of drugs. Something more than an elementary knowledge is desirable, we might say essential, to those who wish to maintain a creditabe position in the profession, and to be prepared for cases of emergency which sometimes occur with reference to poisons, or the impurities met with in food or medicines, or other scientific inquiries in which it is customary to appeal to the Chemist. The knowledge required for dealing with such questions is becoming increasingly important, not only on account of the advancement of education and intelligence among the public generally, but also because Pharmaceutical Chemists being now recognized as a qualified body, more is expected of them in proportion to the amount of responsibility belonging to such position. Much advantage also is derived from the training which the hand and the eye receive in the practice of delicate chemical manipulations; and the habit of accuracy thus acquired, together with a knowledge of the theory of chemical combinations and decompositions, constitute the best foundation for the education of the dispenser of medicines. It has been remarked that the students who are the most proficient in high Chemistry, are not always quick dispensers, sometimes the reverse. This, however, arises partly from the habit of extreme care and accuracy, and nothing is required to remove the deficiency but practice at the dispensing counter. It is much better to learn first to do anything *well*, than by aiming at rapidity to get into slovenly and inaccurate habits.

While we concede to science its full share of importance, as the foundation of the education of the dispenser of medicines, we cannot lose sight of the fact

that the primary duty of the Pharmaceutical Chemist is the translation and compounding of the prescriptions of medical practitioners; and the great object to be attained is the correct understanding of the meaning of the terms employed, so as to ensure the accurate fulfilment of the prescriber's intentions. To the philosopher, who cultivates science for his amusement, it may be a source of pleasure and agreeable excitement to revise the list of chemical equivalents; and in his search for perfection in the arrangement, he may propose a variety of alterations in the numbers, with corresponding changes in the nomenclature. But these innovations not unfrequently occasion much perplexity to the Pharmaceutical Chemist, and place the authors of the Pharmacopœia in this dilemma: that they must either abandon scientific nomenclature altogether (which is the only safe course to adopt), or incur the risk of serious misunderstandings and fatal accidents, from the ambiguity in the terms employed. It may be according to the most esteemed chemical theory an improvement to change the equivalent number of mercury from 200 to 100, but in practice it would be a wicked innovation so to transmute the names of the compounds of mercury, that a prescription ordering five grains of calomel should henceforth be interpreted corrosive sublimate, with other changes equally fatal to patients. We are now threatened with a change in the equivalent numbers of oxygen, from 8 to 16, the consequence of which will be so complete an alteration in the nomenclature of its compounds, that a new manual of chemistry will be necessary to elucidate the improved theory.

In Botany, the change from the Linnæan to the Natural System occasioned some temporary inconvenience to the student, but this inconvenience was not attended with liability to fatal accidents in the administration of medicine, and the superiority of the natural system was sufficient to make amends for some inconvenience. That system is now, therefore, generally adopted, but each professor of botany, while following the general principle of De Candolle, introduces his own modifications and subdivisions, and the student who desires to acquire a complete knowledge of the subject, finds his memory taxed with a variety of synonymes and arbitrary terms, founded on the systems of arrangement adopted in conflicting manuals of botany. This is a minor evil compared to the one above alluded to, for the chief object in view with the Pharmaceutist is a practical acquaintance with structural botany and the general characters, especially those used in medicine. The subdivisions and classification designed to bring the system as nearly as possible to perfection, may occasion additional labour to the student in the first instance, but are not likely to cause any serious mistakes.

What we insist upon is the necessity of avoiding needless and frivolous changes in chemical nomenclature, confounding under the same name compounds entirely different in their properties—some dangerous poisons, others comparatively inert—in the face of which confusion the proposal to introduce a Poison Bill to protect the public against accidents is a palpable absurdity. No amount of education or sagacity in the Dispenser would enable him with certainty to interpret a term which denotes either a violent poison or a safe medicine, according to the date at which the prescriber thought proper to adopt the new theory.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF COUNCIL, *April 7th*, 1858,

Present—Messrs. Bell, Bird, Brew, Davenport, George Edwards, J. B. Edwards, Hanbury, Keeling, Meggeson, Peacock, Sandford, Squire, and Waugh, the following were elected

MEMBERS.

BROMPTON .....Pidduck, John
DUBLIN .....Hamilton, John Travis
LONDON .....Gedge, William Stedman

MAJOR EXAMINATION, *April 20th.*

Booth, Henry.....Rochdale
Dunn, James .....Durham
Parsons, Francis Henry .....Southam
Thompson, John Robert .....Thirsk
Wheldon, Henry William .....Atherton

MINOR EXAMINATION.

Blackman, Thomas .....Woolwich
Nock, Thomas .....Newcastle-under-Lyne
Owles, Edward John.....Southampton
Partridge, William .....Dudley
Rees, Thomas George ....Pembroke Dock
Tucker, Henry .....Henley-on-Thames
Watson, David .....Belper

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	ADDRESS.
Allott, Frederic	Mr. Greaves	Bakewell
Coward, John, Senior	Mr. Butler	Pontefract
Giddings, Wm. Henry Creak	Mr. Stocken	London
Stretton, Charles	Mr. Parker	Derby

PHARMACEUTICAL MEETING,

Wednesday, April 7th, 1858,

MR. JACOB BELL, PRESIDENT, IN THE CHAIR.

THE following donations were announced:—

Journal of the Society of Arts, from the Society.
Journal of the Photographic Society, from the Society.
Bulletin de la Société Botanique de France, from the Publishers.
Quarterly Journal of the Pharmaceutical Society of Victoria, from the Editors.
Bloxham *On the Composition of Building Sandstones*, from the Edinburgh Industrial Museum.
Specimen of English Otto of Roses, from Mr. Whipple.

The following papers were read:—

NOTE ON SOME PRODUCTS OF THE TEREBINTH (*PISTACIA TEREBINTHUS*, L.).

BY SIDNEY H. MALTASS, ESQ., OF SMYRNA.

(*Extracted from a Communication to Mr. Daniel Hanbury.*)

BY the modern Greeks, the terebinth, *Pistacia Terebinthus*, L., is called Τσικκουθιὰ. The Turks name it *Tcetlembik*, and the Europeans *Petelin* or

Petelino. In the Levant it is generally diffused, being found wild in all parts of Asia Minor, in the islands of the Archipelago, in Syria, in Cyprus, &c. When occurring on stony ground and in elevated situations, it is a mere shrub, but in the plains and in other favourable localities, it frequently attains considerable proportions. The leaves appear early in the spring, and are immediately followed by the flowers. The fruit, which forms large clusters, is at first green, and shortly afterwards of a bright red colour. In October, after the first autumnal rains, it changes to a bluish-green, occasionally with a purple tinge. In this state it is considered ripe, and is gathered for the market. It is then of the size of a small pea. Its outer skin has a not unpleasant taste of turpentine, while the kernel possesses the delicate flavour of the pistachio. These fruits are the favourite food of the Oriole (*Oriolus Galbula*), the Blackcap (*Sylvia atricapilla*), the Redcap (*Sylvia rubricapilla*),* and the Flycatcher (*Muscicapa Grisola*)—the last three known in Smyrna and elsewhere under the name of *Beccafico*. In Scio, where the fruit ripens earlier, the kernels are eaten and much esteemed. They are also valued on account of the fixed oil which they afford, and which is used by the lower classes in the same manner as olive oil.

It is in this island also that the resin of the terebinth, known as Scio or Chian Turpentine, is collected. Levrault, whose account is very explicit and correct, says that although the turpentine exudes to some extent spontaneously, it is produced more abundantly from incisions which are made in the trunk and branches in the spring, and from which the resin continues to flow during the whole summer. It is in the morning, says he, after the coolness of the night has somewhat solidified it, that the resin is scraped from the stem and from the flat stones placed at the foot of the tree, to receive that which may have run down. As the resin thus collected is always mixed with some foreign matters, it is purified by straining through small baskets, after having been liquified by exposure to the heat of the sun. As the produce is very scanty, a tree of four to five feet circumference, yielding ordinarily not more than ten or eleven ounces per annum, Scio turpentine is dear even in the island where it is collected. Dr. Barbieri of Scio informs me that at present the trade is almost exclusively in the hands of Jews, who dispose of the resin in the interior of the Turkish empire. During the last two or three years, some small parcels have been procured, on account of orders received from Europe, but it was not known in Scio for what purpose the resin was required.

Dr. Barbieri has further stated that Scio turpentine, besides being used externally and internally in medicine, is said to be mixed in many places in small proportions with wine, for the purpose, as it is asserted, of preserving it, especially where it has to be shipped. I am also assured that the resin is consumed in the island of Candia for the purpose of flavouring *raki*, a spirit containing aniseed, extensively used in all parts of the Levant. It is certain, however, that in Greece and other parts where wine is flavoured with resin, that of the red pine is used.

Another curious purpose for which Scio Turpentine is employed, not only in Scio, but in other parts of the Levant, is in the extraction of superfluous hairs from the face, eyebrows, as well as from the arms and legs of the Eastern ladies.†

[*With reference to the foregoing, we have been favoured with the following note from Dr. Arthur Leared:—*

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* Is not the bird here intended, the Stone-chat Warbler (*Sylvia rubicola*), whose flesh, Cuvier says, is in autumn fat and delicate, and not inferior in flavour to that of the *beccafico?*

Sylvia rubricapilla is a name I cannot identify.—D. H.

† Dr. Barbieri thus describes it :—

" * * * qualmente in mano esperta i fili di seta colla suddetta resina serve a uno uso essenziellissimo immancabile della toiletta delle belle di Levante, cioè l'estirpazione della lanuzza della faccia, e il regolare ordinamento dei supraciglie primo che quella e questi siano abelliti dei colori che loro convengono."

I have seen the Terebinth (*Pistacia Terebinthus*, L.) in the island of Scio and in the neighbourhood of Smyrna. In the latter locality it may be found in most gardens and shrubberies. It is a tree of moderate size, having some resemblance to the mountain ash. Its fruits, which are called by the Smyrniotes *Tzecoutha*, occur in a profusion of clusters, and ripen in September. This period is looked forward to as the season for shooting *beccaficos*, or as they are called by the English, *becfigs*. Three or four species of very small birds are included under this designation. The Smyrniotes pursue this sport with avidity, but in a manner peculiarly oriental. The sportsman takes his place, often seated in a chair, close to a terebinth tree, in which some of the birds are sure to be found, and fires at any becfig that gives him the chance. At the report of the gun the birds fly away to a short distance, but return so quickly, that opportunity for a second shot is frequently afforded by the time the sportsman has reloaded. Great numbers of birds are sometimes thus killed at a *sitting*. They are very fat, and on this account, and for their fine flavour, are much esteemed for the *pilaff*.]

POISONING BY BRYONY ROOT, IMPROPERLY CALLED MANDRAKE.

BY WILLIAM HERAPATH, ESQ., F.C.S., &c.

As there are but few cases recorded of death arising from this plant, I forward the particulars of one which was the subject of a trial at the recent Taunton assizes.

A woman, named Sarah Palmer, had on two occasions applied to a female herbalist for medicines to cure "lowness of mind," and had received from her a solution, which each time had made her very ill; but on her third visit she was pressed into trying it again, and at the same time a similar dose was given to the woman's son. She became ill soon after taking it, and in an hour and a half was attacked with sickness and diarrhœa; in two hours and a half she became speechless, and incapable of motion; at six hours she was seen by a medical man, who found her unconscious, speechless, her pupils dilated, pulse slow and weak, her teeth clenched; at twelve hours her breathing became stertorous, and her limbs contracted, from overaction of the contractile muscles. She died in thirty-six hours.

Upon a *post mortem* by Mr. Walker, the vessels of the scalp were reported full of blood; the membranes of the brain injected, as well as the brain itself; the cerebellum still more conjected; the lungs conjected throughout with dark fluid blood; the heart contracted and empty; the intestines empty and inflamed; the stomach inflamed. It contained about one ounce of fluid, from which all traces of the poison had passed, as might have been expected, after thirty-six hours of life.

I found the stomach much inflamed, and more generally than with mineral irritants. The bottle which had contained the mother's dose was empty, except a small portion adhering to the inside, looking like extractive (apothegm); but the microscope and the action of iodine and ether proved it to be jalap root.

The son's dose had not been taken. It was something more than three ounces. Upon submitting it to analysis, I separated 35 grs. of powdered jalap and 2.64 grs. of bryonine, which, by a comparative experiment, I found to be contained in two drachms of dried, or in one ounce of recent white bryony root.

This case will teach us what is a mortal dose of this poisonous plant, and also that it is not, as imagined, a simple irritant, but a narcotico-irritant, as proved not only by the symptoms, but the *post mortem* examination.

My experiments lead me to the belief that what has been named bryonine is not the proximate element it is considered.

Old Park, Bristol, April 3rd, 1858.

The Chairman said, it would have been more satisfactory if Mr. Herapath had given some account of the method he adopted for detecting and isolating the active principle of the bryony root, to which he referred in his paper. He believed there was but little known of the properties of bryonine, and of the tests by which it might be identified; and Mr. Herapath would have done good service by supplying the deficiency in these respects. He hoped he may yet be induced to supply what must be admitted to be a defect in his communication.

Dr. Edwards, Mr. Hanbury, and Mr. Bentley concurred with the Chairman in regretting that further details had not been given by Mr. Herapath.*

SOLUBLE SILICATE OF SODA, WATER GLASS, OR MINERAL GUM.

Dr. Edwards introduced specimens of "Water Glass," and a solution of the same, sold as "Mineral Gum," substances which were being largely manufactured near Liverpool, and applied to several important purposes of commerce. The substance is a silicate of soda, being a transparent green glass, long known to Chemists as "Soluble Glass." It has only recently attracted the notice of manufacturers, who now find it possesses properties rendering it highly useful, and indeed remarkable for the variety of its applications. It is prepared from quartz sand, and soda ash. The glass is very finely ground, and then dissolved by the agency of hot water and steam. The solution is then concentrated to 20°, 30°, or 50° of Twaddle, and sold of the strength best adapted for the purpose contemplated. A large demand has recently arisen for it as a size for calicoes, &c., in lieu of British gum, the glaze being superior, and the price (£6 to £7 a ton) being lower.

It is also getting in demand for soap-making, being itself a detergent, and mixed with common soap, preventing the usual loss by evaporation, and increasing the weight. It has been used by several parties in this country and abroad for saturating timbers, scenery, dresses, and other inflammable material, being itself of a highly incombustible nature, and thus protecting other substances to a great extent from the action of fire. The solution consolidates into a clear glass or varnish, which is not acted on by cold water, and may therefore be freely washed therewith. In contact with lime it consolidates, and is partly converted into silicate of lime. Hence it has been employed, especially in Berlin, in the process called "Stereochrome," a revival of fresco painting on the walls of buildings; the design being perfectly protected by the application

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* The President having communicated the substance of these observations to Mr. Herapath, has received the following in reply :—

"My dear Sir,—The jalap was readily detected by the aid of the microscope, with tinct. iodine and solution of bromine as reagents. The first identified the texture, and the reagents the starch granules. The quantity was found by submitting powdered jalap to the action of water, and having dried the residue at 212°, the weight found gave that originally taken. The bryonine is best separated by evaporating to dryness the cold solution with an excess of lime, then acting on the dried mass with ether, which dissolves a little wax and some little white bryonine. The residue is treated with warm alcohol, and evaporated to dryness. There is another method by using subacetate of lead, but it is by no means so simple.

"I remain, yours very truly,

"William Herapath."

of a solution of the "water glass," as a varnish over the surface. This may be freely washed, and, if necessary, renewed from time to time.

The same substance is the essential element in Ransome's artificial stone process, and other similar processes, in which a porous sandstone or limestone is saturated with this silicate, which not only consolidates, but combines with the lime, forming a compact mass of flinty hardness, and impervious to atmospheric influence.

Its solution possesses highly adhesive properties, and may be considered the basis of a good cement for glass and china. By itself it holds fragments with great tenacity in the cold, but yields on the application of heat. The solution for this purpose must not be too strong, and if mixed, when used, with a little lime, the cement is very firm.

With such a variety of useful properties, the hope may be entertained that some application of it may be suggested available to purposes of Pharmacy.

AMORPHOUS ANTIMONY.

Mr. Redwood exhibited specimens of metallic antimony in the peculiar molecular condition described by Mr. Gore of Birmingham, in a notice which appeared in the *Pharmaceutical Journal* for March, page 474. Antimony was one of the metals which usually presented a distinctly crystalline appearance, but Mr. Gore had pointed out the fact that when this metal was deposited by the electro-process from a solution of tartar-emetic in ordinary chloride of antimony, the appearance, structure, and physical properties of the metal were very different from those presented by ordinary commercial antimony, or by antimony deposited by the electro process from a solution of tartar-emetic and tartaric acid in dilute hydrochloric acid. He (Mr. R.) had received specimens of the amorphous antimony from Mr. Gore, with which he proposed to exhibit to the meeting one of the remarkable properties which the metal possessed in this state. It would be observed that the little bar of antimony he held in his hand was made in the form of a shallow trough, into the hollow part of which he would put some cold water, and then, on striking one end of the bar with a small hammer, a sudden molecular change occurred in the metal, attended by so great an elevation of temperature as to cause the water to boil, while the metal passed from the amorphous to the crystalline state.*

NITRO-GLYCERINE OR GLONOINE, AS A THERAPEUTIC AGENT.

Mr. Redwood brought this subject before the meeting, referring to the correspondence which had occurred in reference to it in one of the medical journals. There was on the table a specimen of nitro-glycerine, which was presented to the Society in 1851 by Dr. Vry, of Rotterdam, by whom a notice of it was written about that time, a translation of which appeared in the *Pharmaceutical Journal*, vol. xv., page 229. The following extracts from Dr. Vry's paper were read, the subject having acquired a new interest from the recently proposed application of nitro-glycerine in medicine :—

* Errata.—Mr. Gore has requested the following corrections to be made in his paper, contained in the March number of this journal, at page 474 :—

For crystalline antimony :—Dissolve 5 parts of tartar emetic and 5 parts of tartaric acid in a mixture of 2 parts of hydrochloric acid, and from 30 to 40 parts of water.

For allotropic or amorphous mercury :—Dissolve 1 part of tartar emetic in 4 parts of ordinary chloride of antimony.

Operate upon each liquid by an anode of antimony with two pairs of Smee's batteries, in the usual manner.

Also, last paragraph, last word but one, *instead of* "pressing," *read* "fusing."

"In 1847, when Chemists were intent on the production of gun-cotton, M. Sobrero made known the fact that glycerine, when treated with a mixture of sulphuric and nitric acids, yielded a similar compound, which he described as an oily liquid, heavier than water, in which menstruum it was almost insoluble, although readily dissolved by alcohol and ether.

"According to this author, the smallest quantity of it was sufficient to produce a most violent headache, from which he concluded it would prove a most dangerous poison.

"These observations attracted my attention, and in 1851 I determined to prepare some for examination. My experiments, made on a small scale, succeeded perfectly, and enabled me to corroborate the truth of M. Sobrero's statements. I found, however, that it possessed no poisonous properties, although occasioning intense headache; for upon administering ten drops to a rabbit, no symptoms of poisoning appeared.

"The desire of investigating this subject further induced me to undertake the preparation of a larger quantity of this substance. The attempt, however, deprived me of my eyesight for a considerable time, in consequence of the explosion of the mixture. After my recovery I resumed my inquiries, and prepared a considerable quantity of nitro-glycerine, which enabled me to determine with greater accuracy some of its properties. The result of these experiments I communicated in 1851 to the British Association.

"My attention has lately been again directed to this subject by the statement in some foreign journals, that nitro-glycerine is being employed in America as a therapeutic agent under the name of Glonoïne. Besides the interest which attaches itself to this substance in a scientific point of view, therefore, it seems to possess a certain value as a pharmaceutical agent.

"This consideration induced me to try and ascertain the best mode of preparing this substance, and again reviewing its principal properties.

"*Preparation.*—After repeated experiments I found the following the best mode of preparation:—100 grammes (1543.3 grs.) of glycerine, freed as much as possible from water, and having a sp. gr. 1.262, were cautiously, and in small quantities at a time, added to 200 cubic centim (18 ounces) of monohydrated nitric acid, previously immersed in a freezing mixture. The temperature rises upon each addition. It is therefore necessary to allow the mixture to cool down again to —10° C. (14° Fahr.) before any fresh addition is made, as it is very necessary that the temperature should never rise above 0° C. (32° Fahr.). When the glycerine and nitric acid have formed a homogeneous fluid, which may be facilitated by stirring the mixture with a glass rod, 200 cubic centim (18 ounces) of concentrated sulphuric acid are cautiously and slowly added.

"This operation is accompanied with the greatest danger, if the temperature is not continually watched. Experience, however, shows me that there is no reason for fear, provided the temperature be always kept below 0° C. (32. Fahr.).

"Once I saw the temperature run up to 10° C. (50 Fahr.) without occasioning an explosion; but between 10° C. and 20° C. a violent reaction suddenly takes place, and the mixture is violently propelled from the vessel. I, however, repeat again that such an accident can be safely avoided by keeping the temperature below 0° C.

"When these precautions have been taken the nitro-glycerine separates, after the addition of the sulphuric acid, in the form of an oily liquid floating on the surface, and may be collected by means of a separating funnel.

"The product thus obtained, which is still contaminated with a little acid, weighs about 200 grammes (3086.6 grs.). A still further portion, however, about 20 grammes (308.6 grs.), may be obtained from the acid liquor by diluting it with water.

"The products thus obtained are then dissolved in a small quantity of ether, and this solution repeatedly shaken with water till all trace of acid is removed. The ethereal solution is then heated over a water-bath till nothing more is volatilized. The resulting quantity will be about 184 grammes (2838.6 grs.). The composition of glycerine being $C_6 H_8 O_6 = 92$, and 100 parts of glycerine yielding 184 of nitro-glycerine, we may infer that the composition of nitro-glycerine is $C_6 H_6 (2\ No4) O_6 = 182$. I am at present endeavouring to ascertain if this inference is correct.

"*Properties.*—Nitro-glycerine is an oleaginous liquid of a clear yellow colour, having a sp. gr. from 1.595 to 1.600. Heated to 160° C. (320° F.), it is decomposed,

evolving red vapours; at a higher temperature it either explodes or inflames without any detonation.

"It is difficult to determine accurately the point at which explosion takes place; it is best observed by allowing the nitro-glycerine to drop from time to time upon a piece of heated porcelain. At first it burns away with a vivid flame, but as the temperature diminishes, it violently explodes, evolving red vapours, and frequently breaking the porcelain on which it falls.

"By placing a drop on an anvil and striking it with a hammer, it instantly detonates. When properly prepared and free from acid, it may be kept for any length of time. I have some in my possession which has been kept for two years without undergoing the slightest change.

"Upon the addition of sulphuric acid to the ethereal solution, decomposition ensues, and a great quantity of sulphur is thrown down.

"I am engaged in investigating this reaction, which perhaps may throw some light on the constitution of nitro-glycerine."

Nitro-glycerine appeared to have been used for several years past in America, under the name of Glonoine; it had also been used in this country by homœopathic practitioners. Recently it had been brought into more general notice by the publication of the results of some experiments which had been made with it by Mr. Field of Brighton, by Dr. Fuller of St. George's Hospital, and by Dr. Harley of University College, which results were published in the *Medical Times and Gazette* of March 20th and April 3rd.

The following was Mr. Field's description of his experience of the effects of glonoïne:—

"In the evening of the 3rd of February, 1858, I was conversing with a homœopathic practitioner, when he mentioned a medicine which possessed peculiar and extraordinary qualities, some of which he described as having affected himself, though he had taken it in very minute quantities. I laughed at his credulity, and offered to take as much as he pleased, upon which he let two drops of what he called the first dilution of glonoïne fall on my tongue. After swallowing this small quantity of fluid—I was assured the quantity did not exceed two drops—I asked what effects I must expect, but was told to wait and observe for myself. I then purposely conversed on other subjects. In about three minutes I experienced a sensation of fulness in both sides of the neck, to this succeeded nausea, and I said, 'I shall be sick.' The next sensation of which I was conscious was, as if some of the same fluid was being poured down my throat, and then succeeded a few moments of uncertainty as to where I was, during which there was a loud rushing noise in my ears, like steam passing out of a tea-kettle, and a feeling of constriction around the lower part of my neck as if my coat were buttoned too tightly; my forehead was wet with perspiration, and I yawned frequently. My intellects returned, however, almost immediately, and I remember saying, 'This has nothing to do with homœopathy, but it has to do with a very powerful poison; there are more things in heaven and earth than are dreamt of in the philosophy of some of us.' I also reproached my friend for not having tested the anæsthetic power of the medicine, by inflicting a slight wound on me. I need scarcely say I am thus minute in my description of what occurred, that an accurate idea may be conveyed of the actual effect produced on me, as well as to justify the uses to which I have since put the medicine. When these sensations had passed off, which they did in a minute or so, they were succeeded by a slight headache, and dull heavy pain in the stomach, with a decided feeling of sickness, though without any apprehension that it would amount to vomiting. I lay on a sofa, feeling rather languid, but talking cheerfully, conscious at the same time that I could very well exert myself both mentally and physically, if I liked, but that it was more pleasant to be idle. This condition lasted about half an hour, at the end of which I was quite well and walked home, a distance of half a mile, with perfect comfort. I slept soundly from one o'clock till six, when I was called up, having a slight amount of general headache, but not such as I should have regarded but for the recollection of last night's adventure.

"The physician to whom I am indebted for this overdose told me, that when his first impression that I was shamming had passed off, my condition caused him the greatest alarm, for he really thought he had killed me. I learn from him that my

head fell back, my jaw dropped, I was perfectly white, breathing stertorous, and no pulse at the wrist for the space of about two minutes. He immediately rushed to a closet and procured some stimulant, which he poured down my throat. I had never been in better health and spirits than on the day of this occurrence, and had taken nothing for hours but a little cold tea.

"This same first dilution of glonoine consists of one drop of a peculiar chemical compound, dissolved in ninety-nine drops of rectified spirit; and glonoïne itself, I learn to be a nitrate of oxyde of glycyl, prepared by adding nitric and sulphuric acids to glycerine, the temperature of the fluids being kept down by a freezing mixture."

The experience of Dr. Fuller was, however, very different from that described by Mr. Field. He says:—

"The extraordinary effects ascribed to glonoïne by Mr. Field, in a communication inserted in the *Medical Times and Gazette* of the 20th instant, induced me this morning to undertake a series of experiments, in conjunction with Dr. Harley, of University College, with the view of testing the effects of this agent; and as the subject is one which has attracted some attention, it may be useful to make the profession acquainted with the results at which we arrived. I leave to Dr. Harley to describe the details of the experiments in his own case, as also of those on a rabbit to which we administered this substance, and shall merely premise that the glonoïne which I swallowed was pure glonoïne, obtained from Morson's, of Southampton Row, diluted with 10 parts of rectified spirit; whilst the glonoïne which Dr. Harley took was pure glonoïne, obtained from a homœopathic Chemist, diluted with 6¾ parts of rectified spirit. Eight drops of this latter solution added to 92 drops of rectified spirit would form (so the homœopathic Chemist stated) the solution of glonoine known to homœopathists, and described by Mr. Field as glonoïne of the first dilution. It would contain 1 drop of pure glonoïne to 99 of spirit.

"Our experiments commenced at 12.45 o'clock, at which time my pulse was 80, and my respirations were eighteen in a minute. I began by taking 2 drops of a solution containing 1 drop of pure glonoïne in 99 of rectified spirit—the solution employed by Mr. Field. It was sweet to the taste and warm, and imparted a flavour or odour somewhat resembling chloric ether. In the course of a minute I felt, or fancied that I felt, some fulness in the head, but was not conscious of any other unusual sensation. At four minutes past 1 o'clock I took 2 drops of the solution obtained from Morson's, or in other words, one-sixth of a drop of pure glonoïne, which is equal to 17 drops of the solution spoken of by Mr. Field. It was very sweet, and pungently hot to the tongue and throat, giving rise to a burning sensation which lasted several minutes. At six minutes past 1 my pulse had risen to 96, and I felt, or fancied that I felt, increased fulness about the head, but without giddiness or confusion of thought. My pupils were not affected, and I did not experience any unusual sensation beyond that just referred to. At 1.15 o'clock I took 4 more drops of Morson's solution, or in other words, one-third of a drop of pure glonoïne, which is equivalent to 33⅓ drops of Mr. Field's solution. At 1.18 o'clock my pulse was still 96; my respiration remained tranquil; my pupils were unaffected, and I was not conscious of any unusual sensation, except a sense of slight fulness in the head. As no further symptoms occurred, at 1.30 o'clock I swallowed 6 drops of Morson's solution, or in other words, half a drop of pure glonoïne, which is equivalent to 50 drops of Mr. Field's solution. It was intensely hot to the mouth and gullet, rendering it necessary for me to swallow half a glass of water. I felt somewhat nervous, and for a few moments the surface of my body became covered with a clammy perspiration; my pulse intermitted occasionally, and I experienced, or fancied that I did so, an increase of fulness about the head; but my pupils remained unaltered, and in no other respect did I perceive any difference from the effects produced by the former and smaller doses. In a few minutes the nervousness passed off, and at 1.35 o'clock my pulse was 90 and regular. At 1.40 o'clock my pulse was 86, and my respirations were 16 in a minute. At 1.50 o'clock my pulse had fallen to 80, or the standard at which it was found before the commencement of the experiments.

"Thus, within the space of one hour I took rather more than 1 drop of pure glonoïne, which is the amount contained in 80 drops of the solution spoken of by Mr. Field. This would appear conclusive as to the fact, that whether in weak solution (1 in 100) as employed by the homœopathists, or in a strong solution (1 in 6),

glonoïne does not produce the effects which have been ascribed to it; and that, contrary to what has been stated by Gmelin and implied by Mr. Field in his recent communication, it may be taken with impunity in considerable quantity. Whether the acceleration of the pulse which was observed in the first instance was attributable to the effect of glonoïne, is a question which requires further experiments to determine. My own impression is, that it was purely the effect of the nervousness or excitement resulting from the experiments in which we were engaged, for had it been otherwise, it is not probable that the pulse would have fallen to its natural standard within so short a period after taking the larger doses. The fulness in the head may have been attributable in part to the same cause, but some discomfort about the head, not amounting to headache, continued for several hours afterwards, and I cannot help thinking that it is fairly referrible to the effect of the glonoïne I had taken. I will only add, that for some weeks I had been suffering from slight bronchial irritation, with frequent expectoration of thick mucus, and that since I swallowed the glonoïne I have not had occasion to cough or expectorate."

The results thus described by Dr. Fuller were substantially confirmed by Dr. Harley. Both these physicians failed to produce effects such as had been described by Mr. Field.* Although it thus appeared that nitro-glycerine or glonoïne was not so powerful a medicinal agent as Mr. Field's first account seemed to indicate, yet it was probable that it would be tried by other medical men, and it was therefore important that Pharmaceutical Chemists should be acquainted with the particulars of what had been published on the subject.

Dr. Edwards remarked that he had several times prepared glonoïne for medical use, and he thought the physiological evidence affirming its peculiar action on the nervous system was fully established. He thought much had yet to be learned with respect to the action of minute doses of medicine, and that it was wrong to assume that because certain results followed the exhibition of minute doses, that much more violent effects of the same character would be produced by larger quantities. Glonoïne appeared to undergo decomposition resembling that of gun-cotton when long kept, especially if exposed to the light, or in a warm temperature.

PHARMACEUTICAL MEETING, EDINBURGH.

A Scientific Meeting of the Pharmaceutical Society was held in George Street Hall, on Friday evening, 26th March, at 9 o'clock,

MR. W. FLOCKHART, PRESIDENT, IN THE CHAIR.

Dr. Stevenson Macadam read a paper on the

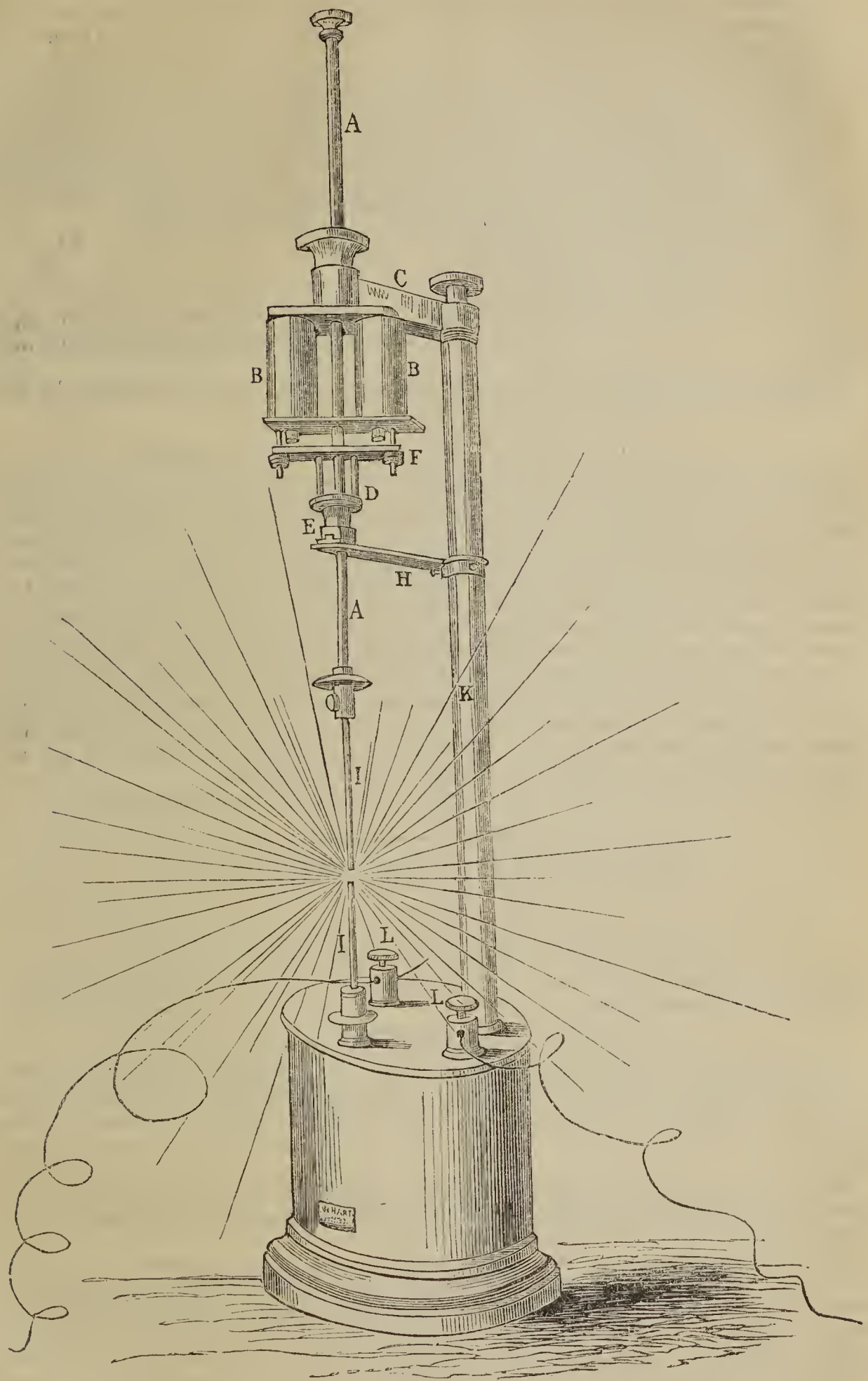
CORRELATION OF FORCES.

Dr. M., in illustrating his subject, showed a variety of beautiful and interesting experiments, in order to prove that electricity, magnetism, light, and heat were correlative forces, and mutually resolvable into each other. He then explained and exhibited a recently improved Electric Lamp, the machinery and construction of which belonged to Mr. Wm. Hart, Philosophical Instrument Maker, College Street, Edinburgh.

The principal feature in this new lamp consisted of an ingenious contrivance, by which the great difficulties hitherto encountered of obtaining a permanent and steady light were, to a considerable extent, overcome.

The following drawing will explain the arrangement of Mr. Hart's lamp.

* Mr. Field has subsequently repeated the experiments on himself, and has got results similar to those described by Drs. Fuller and Harley.



A A. Movable adjusting conductor for holding the upper electrode.
B B. Soft iron bar, forming a magnet so long as the current is maintained between the electrodes.
C. Hollow projecting arm for supporting the magnet, armature, and conductor to the upper

electrode. This support, and the hollow stem K, both contain *within them* an insulated conductor from one of the battery poles, while the material of the arm and stem becomes the conductor for the other pole.

D. Ring attached to the armature of the magnet F, and so adjusted that so long as the current is maintained and the armature is kept in contact with the magnet, it causes the ring to act upon the hollow wedges E, so as to embrace the conductor A, and draw the electrodes asunder. When the current ceases by the destruction of the points of the electrodes, F drops off, D slips down, E opens, and A I fall into contact. The current is then re-established, and in an instant the electrodes are again at their proper distance. So instantaneous is the adjustment of the points, that no break or flicker in the light is observable.

H. Projecting arm, supporting the hinged truncated points of the hollow wedges.

L L. Connecting screws with the two poles of the battery.

I I. Positive and negative electrodes.

At the close of Dr. Macadam's remarks, Mr. Hart exhibited a series of highly finished views and sketches by the aid of the electric light introduced into a magic lantern.

Thanks were specially voted to Dr. Macadam, and also to Mr. Hart, for their interesting communications.

REMARKS UPON ATEES. BY MR. JAMES ROBERTSON.

Powder of the root of Aconitum heterophyllum (N. O. Ranunculaceæ), unlike the rest of its family, is not poisonous, but a pure bitter tonic, and as such, much used by the natives. It has been used very extensively as a febrifuge during the last eighteen months by a medical gentleman in the East India Company's service, and he is satisfied that it is second only to quinine, while the Atees is not liable to affect the head, and has a very decided effect in preventing relapses. The dose of the powder is ℈i three times a day. It costs in India about 2*s.* per lb., and can be had in any quantity. The plant itself is figured by Royle in his Illustrations of Botany and of the Himalayan Mountains, and resembles very much in appearance the ordinary Aconitum Napellus, only the leaves are not so deeply cut. The roots are oblong tubers about an inch long, of a light grey colour externally, white in the inside, and of a pure bitter taste. The plant is a native of the Himalayas, growing at the height of 9000 to 10,000 feet above the level of the sea.

Mr. R. presented a specimen of the powder to the museum of the Society.*

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The twelfth meeting of the session of the above Society was held at the Royal Institution on March 25th,

H. S. EVANS, ESQ., THE PRESIDENT, IN THE CHAIR.

Donations to the Library were announced by the Secretary, consisting of three vols. *Pharmaceutical Journal*, Thomson's *System of Chemistry*, Griffin's *Chemical Recreations*, Phillip's *Translation of the Pharmacopœia*, *Outlines of Botany*, and the *British Botanist's Field Book*. Several donations to the Museum were also announced.

Dr. Edwards introduced to the notice of the meeting some amorphous phosphorus and amorphous explosive antimony, and made a few observations on the chemical character of each of these substances.

In presenting specimens of the crude urate of ammonia (the dried urine of the boa constrictor), pure uric acid, and alloxan, Mr. Clapham wished to correct an erroneous impression respecting the excreta of the boa and other serpents, wholly taking the form of acid urate ammonia; for in a recent visit to a zoological collection, he made special inquiry of the keepers of the reptiles on that subject, and found that two distinct kinds of excrement were voided: one of a black and scyballous character, having a most offensive odour; the other (the urinous portion) being in a semifluid or pasty state, and of a whitish colour. The former

* A notice of this root will be found in vol. xvi., page 311 of this Journal.

was rejected, the latter collected and dried—being a valuable source of uric acid ; as it yielded from 70 to 90 per cent., in a state of tolerable purity. In this way he had obtained the sample of uric acid before them, and it was interesting in its character, as forming the starting-point for the preparation of several very beautiful salts, &c., which would ere long, no doubt, be made in the arts. One of the most important of these perhaps was alloxan, obtained by the action of strong nitric acid upon pure uric acid in the cold. This yielded a crystalline salt, which had peculiar staining properties, and produced scarlet and crimson tints (according to the chemical used along with it) of great depth and brilliancy, having, along with some other preparations of uric acid,g reat affinity for animal matter. He (Mr. C.) apprehended it would prove a valuable agent in silk dyeing. Its application to wool he saw on the Continent some time ago, and heard of some French house having taken it up, and with considerable success, too, judging from the patterns exhibited. He had expected being able to place samples of wool, silk, and cotton dyed by it, before them that evening, but would, however, contrive to do so at an early date.

Mr. ABRAHAM then delivered a lecture

ON THE APPLICATION OF THE PROCESS OF EVAPORATION IN VACUO TO PHARMACY.

He commenced by stating that when water in a pan was put upon a fire, it became hotter and hotter until it boiled ; but the boiling temperature varied with the atmospheric pressure being higher when the barometer is at "fair," and lower when that instrument is at "stormy." The boiling temperature might be much further reduced by putting the liquid into a close vessel, and removing the air by a pump. In neither of these cases did the temperature at any time rise beyond that at which it first boiled. But if the water contained other substances in solution, the phenomena were somewhat different. The boiling temperature became higher and higher, as the liquid became more concentrated ; and when it ceased to be perfectly mobile, the advantages of the vacuum were almost lost. On this fact had been founded objections to the process, but the conclusion he drew, and the practice he followed, was to withdraw the concentrated solution as soon as the liquid, be it infusion, decoction, or expressed juice, became syrupy. The vacuum distillation enabled them to get rid of a large portion of the moisture at a low temperature, and in the absence of air. Heat and air, jointly or separately, but particularly if jointly, acting on vegetable solutions, were well known to decompose many of the liquids which chemists wished to compress into a solid or concentrated form ; and he considered the process as necessary for the proper practice of Pharmacy, as for sugar refining. He described the apparatus he used, and stated that an important precaution, which much facilitated the practical application of it, consisted in allowing the condensed water to accumulate in the jacket of the still, and in admitting the steam at the bottom, so that the contents of the still could not be heated beyond the temperature of the water. He finished the extracts by drying upon plates in a current of warm air. Without the precautions he mentioned, the process would be worse than useless, unless an efficient stirring apparatus could be adapted to the still. He found that extracts made by his process kept far better than those made in the ordinary way; and to exemplify this, he placed on the table a number of extracts which had been made from one year and a half to three years and a half.

The CHAIRMAN thought that a much less complex apparatus might be devised.

Dr. EDWARDS thought the expense of the apparatus a great objection, and that he had seen extracts made by ordinary means more characteristic than those on the table.

Mr. MERCER thought that spontaneous evaporation would answer as well.

Mr. ABRAHAM admitted that there were other methods by which equally good extracts might be made, but they were not practicable except on a small scale. Spontaneous evaporation would be inapplicable to a hundred gallons of infusion of senna, which would be totally spoiled by boiling in an ordinary pan. If it was as easy to tell the difference between good extracts and bad, as to distinguish the difference between white sugar and brown, he believed that the vacuum still would be as generally applied by pharmaceutists as by sugar rfiəners.

Royal Institution, April 8th, 1858.

H. S. EVANS, ESQ., IN THE CHAIR.

The following gentlemen were elected Members of the Association:—Mr. Wm. Houghton, Warrington; Mr. Davies, Liverpool.

Donations to the Library and Museum were announced by the Secretary, consisting of Thomson's *London Dispensatory*, several chemicals, a quantity of the Bebeeru Bark, the produce of the *Nectandra Rodiæi*, from which the alkaloid bebeerine is obtained, the wood of the tree called Greenheart, being largely used in shipbuilding and the construction of piers. A specimen of the Australian Sassafras, or Plume Nutmeg Bark (*Atherosperma Moschata*). Also two specimens of organic Phosphates from the West Indies.

Prof. T. C. Archer then proceeded to deliver the lecture of the evening,

ON THE BEAUTIES OF STRUCTURE IN THE VEGETABLE KINGDOM.

On a former occasion Prof. Archer delivered a lecture to the Association under the same title, the illustrations being derived from Phanerogamous or flowering plants. On this occasion, the Cryptogamic or flowerless plants were brought under notice. He commenced by a few general observations on the difference between these two great divisions of the vegetable kingdom, stating that, although the former were considerably more attractive, from their showy character, to the ordinary superficial observer of Nature's productions, yet, to the student in botanical science, the cryptogamic were not less interesting and instructive. Following the natural classification, Prof. Archer entered very minutely into a description of the beautiful structures which are to be found in the very numerous genera composing the Filices, Musci, Algæ, and Fungi. He first gave a very lucid and interesting exposition of the reproductive organs or spores, illustrating his remarks by reference to coloured diagrams, stating that these very minute organisms were so extremely small and light, that even the evaporation from the surface of the earth was quite sufficient to raise and distribute them far and wide. He next adverted to the manner in which the spore cases burst and scatter the spores, and the manner in which the latter germinate, grow up, and eventually reproduce similar plants. In connexion with this part of the lecture, it was remarked that, notwithstanding that the size of the plants of the different species of these orders varied so very much—as from the beautiful little lycopodiums to the gigantic tree ferns of the tropics—the spores are all nearly the same size. The lycopodium of commerce being composed of the spores of *Lycopodium clavatum*, and being extremely light, is scattered in all directions with the least agitation of the surrounding air. It is also highly inflammable. In the fossil flora, the Professor observed, that the form of the higher class of plants were not nearly so well preserved as that of the ferns. In the coal formation the fronds were often to be met with singularly perfect in their outline. The moss tribe was next brought under notice, and this part of the lecture was illustrated with beautiful coloured drawings of some of our native mosses, and their peculiar structure pointed out and physiologically examined. The Equisetaceæ or Horsetail tribe were next adverted to. The spore cases around the receptacle were shown, and the manner in which these burst, scattering the spores in the water, which in course of time produced new plants. The peculiar hair-like elaters twisted round the cells of this class of plants were pointed out, and their hygrometric character noticed. Fossil specimens of these plants were stated to be particularly interesting. The Professor next introduced to the attention of the meeting the highly important and useful plants, the Lichens. He entered into a general description of them, explaining the gonidia, thecæ, &c., their mode of reproduction, and their value in a commercial point of view, naming a number which are very extensively used in dyeing, and alluding to the elaborate and valuable researches of Dr. Lauder Lindsay on this class of plants. The algæ were noticed, as being particularly interesting to the explorer of the lower forms in the vegetable kingdom. Seeing that some of the smallest specimens could only be examined by means of a microscope, in a drop of water, while others have been found in the deep seas upwards of 1000 feet in length, and of great beauty in form and colour.* The minute algæ are very interesting, from the manner in which

* A beautifully coloured drawing of an Australian sea-weed was passed round the room for inspection, being the first plate of Dr. Harvey's exquisite work on the Sea-weeds of Australia.

they reproduce their species. Microscopic algæ appear to be capable of coating themselves with silica or flint; and Prof. Harvey states, that in soundings in the Antarctic Seas, a bank 500 miles in length was found entirely composed of these plants covered with silicious matter.

After some further observations on the Fungi, or mushroom tribe, Professor Archer concluded his very able and interesting lecture by a few appropriate remarks, impressing upon the younger members of his audience the fact that the more they cultivate natural science, the greater will be the stimulus to know more of it. And as to those beautiful structures which are entirely hidden from our observation except by means of the microscope, industry in the use of that instrument will reveal unto us a world of new and interesting objects, and afford another proof of the immensity of Creation. And lest it should be thought by some that the acquisition of this information is useless, Professor Archer mentioned that the microscope was now becoming a most useful instrument in assisting the designer in furnishing some of the most beautiful patterns, which he had formed from observations of the exquisite structures in the vegetable kingdom.

A vote of thanks to Professor Archer for his valuable lecture (of which the above is a mere outline) was carried by acclamation, and the meeting broke up.

ORIGINAL AND EXTRACTED ARTICLES.

ON ARSENIC IN PAPER-HANGINGS.

BY ALFRED S. TAYLOR, M.D., F.R.S.

In the April number of the *Pharmaceutical Journal*, at page 520, is a note by Mr. Paul in reference to some experiments performed by Mr. Dugald Campbell on strips of paper coloured with emerald green. The inference drawn from the experiments is, that arsenic is not volatilized by causing hot air to pass over paper thus coloured: and your readers are informed that the results are contrary to the opinions expressed by me regarding the probable effects of such papers on health.

Allow me to state that I have not adopted the theory that arsenious acid is volatilized in the manner supposed by Mr. Campbell. In my evidence before the Lords' Committee (Question 1185), when the question was addressed to me respecting the effect of gas in bringing out any portion of the poison from the paper, I gave the following answer. "It is very difficult to say how the material does get diffused in a room, whether by currents of air, or in any other way. I asked a very distinguished Prussian Chemist (Pettenkoffer), who was over here lately, his opinion (for I see these arsenical papers are strictly prohibited in the kingdom of Prussia), and he told me that he thought it was from the mechanical diffusion of the dust when the powder was put on the paper in a loose manner. He said he had noticed it on a microscope glass which had been kept for some time in a room where there was a flock paper: that he had seen particles of flock which were not visible to the naked eye, but which were plainly visible under the power of the microscope."

That Dr. Halley suffered from such symptoms as are produced by arsenic in the chronic form of poisoning, I entertain no doubt. There was headache, with dryness and constriction of the throat, nausea, loss of appetite, irritation of the alimentary canal, followed in a few weeks by great bodily depression, with symptoms of paralysis affecting one side. These are not such symptoms as the burning of gas in a room would produce. In other cases in which no gas was burnt, the symptoms were similar, and the only conceivable source of arsenic was the green paper on the walls.

There is a difficulty in suggesting a perfectly satisfactory theory to account for these cases; but there is an equal difficulty in accounting for the mode in which a person has been affected with lead-paralysis, by reason of his having slept in a room the walls of which had been freshly painted. I have myself suffered from a severe attack of lead-colic and other unpleasant symptoms, as a

result of breathing the vapours of fresh paint spread on a large surface of canvas in a small room. I do not believe that a Chemist would easily detect carbonate or oxide of lead in the air of these rooms; but the fact of lead-poisoning by such insidious means, is too well established to admit of denial. Poisons find their way more readily into the blood through the lungs than through any other channel; and in white-lead factories, until the practice arose of grinding the mineral in water, the respiration of the fine impalpable dust was a continual source of lead-poisoning. It was not mere contact by the skin, for it was observed in the French factories that horses, dogs, and rats suffered from this form of poisoning. A sunbeam cannot strike across a room without revealing myriads of floating particles in the atmosphere, that are commonly invisible to us, but which are always contained in the air that we breathe. Are we to be told that this dust can, under no circumstances, be derived from the green pigment on the walls of a room, or that it can be safely breathed by every human being, because some of the workmen in colour-factories do not suffer from the effects? I object to these assumptions as wholly improbable.

That arsenic was the cause of the symptoms in Dr. Halley's case, appears to be established by the fact, that they disappeared on the removal of the arsenical paper and the substitution of one not arsenical. We have here as close a connexion of cause and effect as we can reasonably expect to find.

Dr. Halley, who can have no motive but that arising from a desire for scientific truth, states that he has substituted a plain wainscot oak paper; that he has since regularly used the room—the conditions of which, in other respects, remained the same—without experiencing any of the ill effects so constant before; and that he had recovered his health. If, as it is suggested in Mr. Paul's paper, the burning of gas had been the cause of the symptoms, how are we to explain the recovery of Dr. Halley, when the only change that he makes is the stripping of the paper from the walls!

It is said these cases are few, and ought to be very numerous, if really caused by the arsenical papers now so commonly used in dwellings. I would add, they ought to be still more numerous if caused by the burning of gas. The effects produced by the arsenical papers may, however, be influenced by various circumstances—the size of the room—the amount of ventilation—the time during which it is inhabited—and the special susceptibility of the person. Lastly, how many cases of illness, probably arising from this hitherto unsuspected cause, may have been overlooked or set down to other causes. In reference to the action of lead, the same apparent difficulties present themselves. One man is affected with lead-paralysis and other symptoms of poisoning simply from handling pewter pots: another may handle lead for life in his trade as a plumber, without suffering from any symptoms of poisoning. In an establishment consuming the same water poisoned by lead from the same cistern, only thirteen out of thirty-eight persons actually suffered from lead-poisoning, and these in very different degrees. Out of a hundred persons connected with the plumbing trade, the number attacked with symptoms of lead-poisoning is very small. It has been remarked, that among workmen engaged in the white-lead manufacture as well as in the arsenical paper manufacture, there are many that escape for one who is attacked. Mr. Fletcher's workmen, we are informed, prepare weekly *two tons* of this poisonous colour, containing about fifty-eight per cent. of its weight of arsenic: they have been so employed for years, "under the necessity of constantly handling the pigments, and are in the enjoyment of perfect health." Mr. Fletcher called upon me at Guy's Hospital and substantially confirmed Mr. Paul's statement. However surprising it may be that persons should suffer symptoms resembling those produced by arsenic from living in rooms plastered with emerald green, it is to my mind far more surprising that men should *handle* and deal with something like sixty tons of arsenic yearly, and yet be in the enjoyment of perfect health! Mr. Fletcher's experience is not in accordance with that of others. M. Chevallier, some years since, pointed

out the injuries to health produced among workmen by this manufacture, and suggested precautions for their prevention. (See *Annales d'Hygiène et de Médecine Légale*, tome 38, 1847, page 56.)* The use of arsenic in the candle manufacture was formerly justified on a similar principle, but as it turned out, erroneously, for not only did some of the workmen suffer from arsenical poisoning, but the combustion of the candles was reasonably believed to be injurious to health. I am not aware that arsenic was ever found in the atmosphere of a room in which these candles were burnt, although it was no doubt evolved during combustion. In my opinion, the health of the public in such cases is not to be tested by the degree in which workmen escape or are able to resist the effects of noxious manufactures.

In reference to Mr. Campbell's negative experiment, it practically establishes nothing with respect to the question at issue. Dr. Halley's room exposed a surface of 616 square feet of arsenical paper. In one square inch of the paper I found more arsenic than I have frequently found in the whole liver of a person who has died from that poison. Dr. Halley sat in the room for five or six hours at a time. Some symptoms appeared in a *few* days. They were confirmed in *three weeks* by threatened paralysis. Mr. Campbell's experiments, on the other hand, merely show that a quantity of air (the quantity not specified), blown by a bellows for *one hour*, through a tube, heated from 60° to 140° over strips of arsenical paper, exposing in a close bottle a surface of *one square foot* only, did not give any trace of arsenic in a solution of potash placed to receive it! This result is not inconsistent with the view, that the symptoms of Dr. Halley and others proceeded from the arsenical paper-hangings. A perceptible quantity of arsenious acid, if obtained in one hour from one square foot of paper, would render a room, exposing six hundred square feet, in a few days or weeks a complete chamber of death to all who entered it. A similar experiment might be adduced, to show, contrary to well-known facts, that no person can be poisoned by lead, as a result of the emanations from fresh paint! When a scientific experiment does not fairly include all the conditions which it is intended to illustrate, it is worse than useless; for it not only misleads those who do not perceive its irrelevancy, but, in a sanitary point of view, it may be the means of perpetuating a serious evil. It is undoubtedly desirable to collect further evidence on this matter; but in my opinion there is enough already collected, to show that those who have their walls covered with a poisonous powder must be prepared to encounter a certain amount of risk. The manufacturers of the arsenical papers profess to guarantee immunity; but what will follow if they should be mistaken, and if it should in the end turn out that the interests associated with their trade and means of living had clouded their judgment? The Prussian Government have had this subject duly inquired into, and the result of the inquiry has been the following regulation, which is in force in Prussia:—

"Green copper colours containing arsenic are not allowed to be sold as water or oil colours, for painting in-door work or *printing paper-hangings*. If found on the premises of dealers in the latter articles, they are confiscated, and the owner punished with fine or imprisonment."

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* In Bouchardat's *Annuaire de Thérapeutique* for 1846, p. 209, I find the following statement:—The workmen in paper factories, who handle the Schweinfurth green (aceto-arsenite of copper), are subject to serious disorders of health. They sometimes suffer from a cutaneous eruption, with œdema of the face, and boils frequently form in the scrotum. After a time the mucous membrane of the nose shows signs of irritation: there is coryza (discharge of fluid from the nose), with abundant salivation. This is the first stage of the disease. In the second stage, arsenic is absorbed and is diffused through the body—a fact indicated by colicky pains, headache, and prostration of strength. The first effects described in this paragraph by M. Blandet, are evidently of a local kind; the secondary effects only—*i. e.*, those arising from the absorption of the poison—have been observed in persons who have inhabited rooms lined with the arsenical paper.

Assuming that the Prussian Government is labouring under a complete mistake in issuing this prohibition, it will require in the face of recorded facts stronger evidence in support of this view than the opinions of the arsenic-pigment manufacturers.

The manufacture of this paper in England practically furnishes arsenic to the million. It is found not merely on the walls of rooms, but we meet with it in paper wrappers for confectionery, lozenges, cakes, isinglass, gelatine, and other articles of food. I have lately noticed that it is largely employed for wrapping night-lights. I pointed out to a manufacturer of these articles the danger that might arise from the accidental ignition and smouldering of the arsenical wrapper—since, in a close and confined bedroom, the fumes of arsenic might thus be breathed, and affect a person while sleeping. He informed me that the men employed to cut the strips of paper for placing round the night-lights, could not perform the work many hours without suffering, especially in their eyes. I have also been informed, that men who hang this paper on the walls frequently suffer in the eyes and nose.

ON ARSENIC IN PAPER-HANGINGS.

BY F. A. ABEL,

Director of the Chemical Establishment of the War Department.

The experiments performed by Mr. Dugald Campbell with paper-hangings containing arsenic, which were described in the last number of the *Pharmaceutical Journal*, are similar to a series which I have just completed, having been induced to undertake them at the time Dr. Halley's letter on the subject appeared in the *Times*, in consequence of repeated appeals for my opinion on the necessity of removing arsenical paper-hangings from apartments. As these experiments have been varied so as to fulfil every condition presumed to be favourable to the volatilization of arsenic from paper-hangings, and have been carried on for much longer periods than those of Mr. Campbell, I venture to hope that a brief description of them will not be uninteresting.

Two experiments were made, in the first instance, in a room of which the walls were covered with paper-hanging, exhibiting a large pattern of a light green colour. The surface of the paper was not glazed, and the coloured portions were found to have on their surface about two-tenths of a grain of arsenic per square inch. In the first experiment the room was kept thoroughly closed for about thirty-six hours; a portion of its atmospheric contents were then drawn, by an aspirator, first through a solution of nitrate of silver, and then through a tube containing asbestos moistened with ammonio-nitrate of silver. In the second experiment, air was passed through these tests for a longer period than in the first (about five hours), and three gas-lights had previously been kept burning in the well-closed room for several hours. Not a trace of arsenic was detected by a careful examination of the tests at the close of these experiments.

3rd Experiment.—A large glass tube (3 feet 3 inches in length, and 2 inches in diameter) was next filled with slips of arsenical paper-hanging, placed in a small room, in a position where it could be raised to a temperature of about 90° F., and connected with a similar apparatus to that employed in the former experiments, containing solutions of nitrate and ammonio-nitrate of silver. Air was then drawn through the apparatus uninterruptedly for one week (by means of a *Johnson's Aspirator*), three gas-lights being kept burning in the closed room, at intervals, for several hours. The air passed through the apparatus at the rate of one cubic foot in two hours.

4th Experiment.—Air was passed through the apparatus, as before, for twenty-four hours; the tube containing the paper was kept warm, and the air was made to pass through a strong solution of sulphurous acid before it reached the tube.

5th Experiment.—The end of the tube at which the air entered was connected with a large funnel suspended immediately over a burning gas-jet; hot air, mingled with the products of the combustion of gas, was thus made to pass over the paper for three days.

6th Experiment.—The fifth experiment was repeated, the air being passed uninterruptedly for four days.

7th Experiment.—Hot air was passed through the tube, as in the fifth and sixth experiments, for nine days, the coloured surface of the arsenical paper having first been thoroughly roughened by friction, so as to promote the mechanical detachment of the arsenical pigment by the current of air, and to favour to the greatest extent the possible volatilization of arsenic. It should be mentioned, that in all these experiments the tube connecting the test-apparatus with the large tube which contained the paper was plugged with cotton wool, to prevent any particles of the pigment from being mechanically carried over into the test-solutions.

8th Experiment.—Strips of arsenical paper-hanging were pasted together, back to back, with paste in a state of decomposition. Air, collected over the gas-flame, was passed over this paper for a period of nine days; the tube containing the paper was not heated until after the second day.

Not a trace of arsenic was detected in the solutions in any one of these experiments, neither were any arsenical particles carried away mechanically by the air as it swept over the paper, as was proved by a careful chemical examination, after each experiment, of the plug of cotton wool above referred to.

In order to furnish indisputable proof that the green arsenical colour employed in the manufacture of paper-hangings is not affected by air, even when in a finely-divided and perfectly unprotected condition, 600 grains of finely-powdered emerald green were uniformly dispersed through a quantity of cotton wool, sufficient to fill compactly a tall jar of about a half-gallon capacity. A tube, connected with the test-apparatus, and plugged with cotton wool, was passed to the bottom of the jar, and air was drawn through the apparatus continuously for one week, the jar which contained the emerald green being maintained at 90° F. during a portion of the time. Not a trace of arsenic was found to have been volatilized at the conclusion of this experiment.

It may, I think, be very safely concluded from the experiments detailed above, added to those performed by Mr. Campbell, that the possibility of injurious consequences resulting from the employment of paper-hangings coloured with arsenical pigments has been disproved; and that the symptoms which have been described as exhibited by persons who happened to occupy rooms hung with such paper-hangings, can only be regarded as accidentally connected with that circumstance, and are ascribable to other causes.

Royal Arsenal, Woolwich, 23rd April, 1588.

GLYCERINA CUM FERRI IODIDO.

BY MR. W. WILLMOTT.

I observe a communication in your Journal for April, containing directions for preparing the Glycerina cum Ferri Iodido. The writer is of opinion that this compound possesses no advantages over the Syrupus Ferri Iodidi of the Ph. Lond., finding, from his own observation, that it does not remain unchanged so long. This defect, I think, is mainly due to the large proportion of water which he has introduced into his preparation, thereby affording facilities for the iron to pass into a state of oxidation. Pure anhydrous glycerine seems to exert a greater protective influence on the metallic iodides than does a solution of sugar. By preparing the Glycerina cum Ferri Iodido in the following manner, a beautiful as well as satisfactory result will be

obtained:—To one ounce of iodine and eight ounces of distilled water in a porcelain capsule, add gradually four drachms of fine iron wire cut into pieces. Heat the mixture until it acquires a light greenish colour; then filter the solution as quickly as possible into six ounces of pure anhydrous glycerine, sp. gr. 1.270,* taking care to keep the end of the funnel below the surface of the glycerine. Agitate the mixture, so as to mingle the ingredients thoroughly. Next, remove the water by evaporation over a gentle heat, add four ounces more of the glycerine, and stir or shake well together. The Glycerina cum Ferri Iodido prepared in this manner, is not only an elegant preparation, perfectly clear and bright, but with ordinary care will keep any length of time.

I may add that the foregoing formula is founded upon M. Leamy's process, as published in the *New York Journal of Medicine*, September, p. 285, and which appears to have escaped the attention of your readers.

254, *High Street, Borough, April 15th*, 1858.

REPORT OF THE RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION, AND OF THE APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

BY B. H. PAUL, Ph.D.

(*Continued from p.* 521.)

Oxidation of Albumen by Permanganate of Potash.—The experiments made some time since by M. Béchamp† have recently been repeated by Hr. Städeler,‡ who has obtained results entirely different from those described by the former chemist. In the first place he found that, by the action of permanganate of potash, at a temperature of from 50° to 55° C., upon white of egg, no urea was produced; and also, that the quantity of permanganate requisite for the complete oxidation of the albumen at this temperature, was only half that stated by M. Béchamp.

The liquid, when evaporated to a syrupy state, did not deposit crystals of urea, but when mixed with nitric acid, disengaged acetic and formic acids, and at the same time deposited a large quantity of crystals, presenting an appearance similar to that of nitrate of urea, but which were found to consist of benzoic acid. This substance has already been observed to result from the oxidation of protein substances by chromic acid, and by oxide of manganese and sulphuric acid.

Mycose, the Sugar of Ergotised Rye.—Professor Mitscherlich§ has recently examined this sugar, and describes it as crystallizable, readily soluble in water, almost insoluble in alcohol, except at the boiling point, when it is dissolved to the extent of one per cent. It is quite insoluble in ether. The water solution does not give a precipitate with baryta or lime water. When dissolved in a concentrated or weak solution of caustic alkali, no brown colour is produced by boiling the solution even for some hours, nor is any recognizable change effected. A solution of this sugar mixed with soda and sulphate of copper, acquires an intense blue colour, which is permanent; and suboxide of copper does not begin to be deposited until after the liquid has been boiled for several hours.

The sugar dissolves in monohydrated nitric acid, with very inconsiderable evolution of heat. Water precipitates from the solution a glutinous substance, insoluble in water, but readily soluble in alcohol or ether. On evaporating either solution, this substance remains in a glutinous state. When heated, it melts, then decomposes, and finally explodes feebly. When the sugar is boiled with strong nitric acid, it is decomposed, and oxalic acid is produced. The reactions of this sugar with nitric acid, alkalies, and sulphate of copper, are therefore similar to those of cane sugar.

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* If not to be procured, Price's glycerine will answer the purpose.

† *Pharmaceutical Journal*, vol. xvi., p. 173.

‡ *Journ. für Prakt. Chemie*, lxxii., 251.

§ *Bericht der Akad. der Wissens. zu Berlin*, 1857, p. 469.

Mycose dissolves in fuming or ordinary sulphuric acid, without decomposition; when the colourless solution is heated to 212° F. it becomes brown. The form of the crystals is a rectangular octahedron. In the crystallization of this sugar, the development of the crystals is influenced by the nature of the solvent from which they are deposited, as in the case of sorbine and other analogous kinds of sugar; from a water solution it is deposited in crystals with curved faces; while the crystals obtained from an alcoholic solution have very perfect even faces.*

When exposed for some time to a temperature of 212° F., this sugar melts to a perfectly transparent liquid, that becomes vitreous when cold, and crystallizes only after a long time. No water is separated. When heated to 314° F., much water is given off, the sugar swells up, and finally becomes solid again. When more strongly heated it becomes brown, and evolves an odour of caramel. Analysis gave,

Carbon.....	38.37	12	38.09
Hydrogen.....	6.87	11	6.88
Oxygen.....	54.76	11	55.02

The water of crystallization amounted to 9.62 per cent., or two equivalents, which requires 9.52 per cent., consequently this sugar has a composition that may be represented by the formula C_{12} H_{11} O_{11} + 2 HO.

The name of mycose is given to this sugar because it is obtained from a fungus (μῦκος), and it belongs to the same group as cellulose, glycose, and dulcose. It is obtained best by precipitating a water extract of ergot with a solution of basic acetate of lead, separating the excess of lead from the solution by sulphuretted hydrogen, and evaporating it to a syrupy consistence. By repeated crystallization from water and washing with alcohol, the sugar is obtained pure.

Action of Saliva upon Glucosides.—As the ferment contained in saliva determines the conversion of starch into sugar, it appeared probable that under certain conditions glucosides would be decomposed by contact with saliva. It is indeed known that amygdalin is not influenced by it, that this substance may be taken into the stomach, and passes off in the urine unaltered. But the case is different with salicin, which is decomposed in passing through the system, saligenin, together with other products of its decomposition being found in the urine. This induced Hr. Städeler† to digest finely powdered salicin with water insufficient for solution, and some fresh saliva for several hours at a temperature between 38° and 40° C. He then evaporated the liquid to dryness in a water-bath, and extracted the residue with ether. By evaporating the ether he obtained an oily yellow liquid, that soon became a mass of white crystals, presenting all the characters of saligenin, dissolving in ether, alcohol, and hot water; the highly dilute water solution giving a deep blue colour with perchloride of iron; the residue left by the ether contained much sugar. Hence the salicin appeared to have undergone the same alteration as is produced by contact with emulsine.

For the transformation of one gramme of salicin as much saliva was used as could be collected in a quarter of an hour. This quantity probably exceeded what was absolutely necessary, but even if this were not the case, this method of obtaining saligenin is preferable to the use of emulsine.

Diastase does not correspond with saliva in its action upon salicin; a cold infusion of malt digested for some hours with salicin at a temperature of 40° C., did not give rise to the production of a trace of saligenin.

Test for Cinchona Bark and its Alkaloids.—Owing to the difficulty of distinguishing between cinchona bark and other barks substituted for it, in cases where it is not possible to extract the bases and examine them, Hr. Grahe has endeavoured to obtain some means of determining this point readily. He finds that true cinchona bark, when submitted to dry distillation, gives a product of a bright carmine colour.‡

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* Professor Mitscherlich has pointed out this phenomenon in the case of acid phosphate and arsenate of potash, which, when crystallized, form a solution containing some neutral salt, present even faces, but when crystallized from a solution containing some acid, the inclination of the faces at the corner of the crystals approaches nearer by one degree to an obtuse angle, and when there is a large excess of acid present in the liquid from which the crystals are deposited, the planes of the crystals are so much curved that they cannot be measured.

† *Journal für Prakt. Chemie*, lxxii., 250.

‡ *Chemisches Central Blatt*, 1858, No. 7.

This product is characteristic of these barks, and is not furnished by any others that do not contain the cinchona alkaloids. The quantity of this red substance depends upon the amount of the alkaloids, and it appears to afford a tolerable indication of this amount. The test is applied by heating a fragment of the bark weighing about five or ten grains, in an ordinary test tube, and gradually raising the heat to redness. With cinchona bark a whitish smoke is given off, and also water vapour, which condenses on the sides of the tube. Very shortly afterwards the red colour begins to appear, communicating to the vapour a reddish tinge, and at about one inch distant from the heated portion of the tube there is deposited a red pulverulent film, which gradually passes into a thick olcaginous liquid, running down the glass in drops or streaks of a fine carmine colour in the water condensed with it. Close to this point are deposited the tarry products generally resulting from the destructive distillation of vegetable substances.

The following varieties of bark were tested in this way. They were all about ten years old, and had been well preserved. The names given are those proposed by Wiggers. Peeled and unpeeled *china regia plana*, *ch. regia convoluta*, *ch. de Quito rubra plana* and *convoluta*, *ch. de Bagota*, *ch. huanuco plana* and *convoluta*, *ch. pitayo*, *ch. de Quito flava*, *ch. de cusco vera*, *ch. de Carthagena lignosa*, *ch. aurantiaca canaliculata*, *ch. Maracaibo*, *ch. Humalies*, *ch. Loxa vera* and *myricans*, and *ch. Jaen nigricans*. All these yielded the red substance, and even in the case of those barks containing but small amounts of alkaloids, the reaction was distinct and unmistakable. Only in the case of *ch. Jaen albida* it could not be recognized. But the existence of alkaloids in this bark is not by any means certain, and is denied by some.

True cinchona bark from which the alkaloids had been previously extracted by acids, and false cinchona barks, did not yield the red substance. This was also the case with some other kinds of officinal bark that were examined for the sake of comparison. Thus, for instance, *c. angustura*, *c. cassiæ*, *c. Frangulæ*, *c. copallia*, *c. geoffroyæ jamaieensis* and *surenamensis*, *c. juglandis*, *c. pruni padi*, *c. quercus*, *c. rhamni cath*, *c. salicis*, *c. ulmi*, and *c. winteranus*.

The presence of some substances prevents the production of the red substance, even in the case of true cinchona bark. Among these are caustic alkalies, lime, nitric and chromic acids, bichromate of potash, glacial phosphoric acid, and sulphuric acid.

In order to determine what constituent of the bark yielded this red substance, quinine, cinchonine, quinidine, and cinchonidine were severally and collectively submitted to destructive distillation, but they did not in any case furnish the red substance.

Quinoidine, that was probably impure, gave a faint and only transient red coloration. Neither kinic acid nor the tannic acid of cinchona gave any reaction. But any one or all the alkaloids gave the reaction when heated with one or two drops of acetic acid for each grain of the alkaloid. This was also the case when the alkaloids were heated with kinic acid or with the tannic acid of the cinchona bark, and when heated with citric, tartaric, valerianic, butyric, or tannic acids. Cinchonine, quinidine, and cinchonidine, when heated with acids did not give the reaction immediately, perhaps, because these alkaloids sublime readily, but the reaction is always produced eventually when the sublimate melts and runs back again into the heated portion of the tube.

Sulphate of quinine, or any of the cinchona bases mixed with sulphuric acid, are instantaneously coloured red when heated, but the colour soon disappears again, owing to the energetic action of the acid.

Since strychnine yields leucoline when distilled with caustic alkali in the same manner as the cinchona alkaloids, an experiment was made with this alkaloid also, but no red coloration was produced either when it was heated alone or with acids. The same result was obtained with aconitine, atropine, berberine, brucine, emetine, gentianine, morphine, narcotine, salicine, and theine.

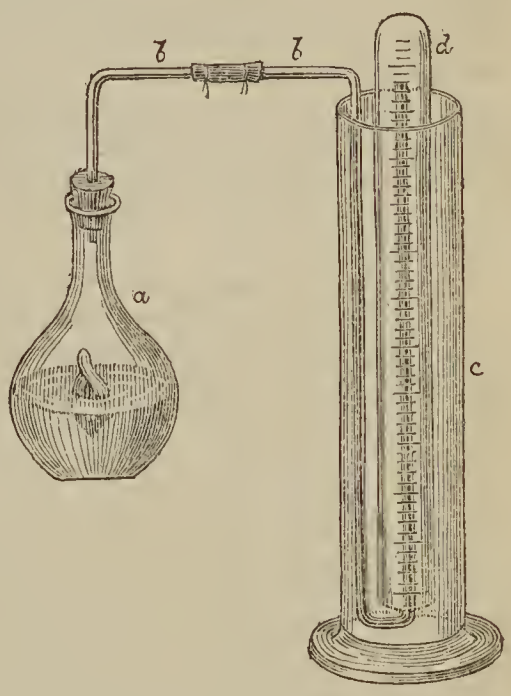
These experiments lead Hr. Grahe to infer that the production of this red substance, when the cinchona bases are heated together with organic acids, is a reaction characteristic of them.

With regard to the nature of the product thus obtained, it is, as might be expected, very complicated. The red oleaginous substance is always accompanied by an acid watery liquid, and has a peculiar aromatic and empyrematic odour, like that of leucoline and that of the cinchona barks combined. When the red substance is left in contact with the air, it becomes brownish-red. Its taste is bitter, burning,

and like that of pepper. It is lighter than water, to which it communicates a slight taste and smell, but without appearing to dissolve. It is soluble in alcohol, and water precipitates from such solution a soft dark-coloured resin.

Action of Chromate of Potash upon Uric Acid; Valuation of Guano.—Professor Erdmann* has found that there are considerable sources of error in the valuation of guano by means of bichromate of potash, according to the method proposed by Hr. Scheibler. Thus, for instance, when the mixture of bichromate and guano is much heated, red vapour is always generated in the retort. When the mixture is but slightly heated, in order to avoid this reaction, a gas smelling strongly of ammonia is produced, and in the neck of the retort there is deposited a crystalline sublimate, which becomes brown when exposed to the air, and consists of cyanide of ammonium. Even when pure uric acid is heated with chromate of potash, and when so large an excess as twelve parts of this reagent to one of uric acid is used, there is still a considerable amount of cyanide of ammonium produced.

For the purpose of estimating the ammonia, Prof. Erdmann employed a modification of the method proposed by Wöhler, and based upon the fact that ammonia is decomposed by a solution of hypochlorite of lime, and nitrogen liberated. In Wöhler's method, the water displaced by the liberated nitrogen, and corresponding to it in volume, always carries over with it some portion of the suspended guano. For this reason, Prof. Erdmann measures the volume of the gas directly, by means of the apparatus represented in the accompanying woodcut.



The flask *a*, of about half a pint capacity, is fitted with a good cork, through which passes a discharge tube, *b*, passing into the glass jar, *c*, and into the graduated cylinder, *d*. In making an experiment, the flask is not quite half filled with a solution of hypochlorite of lime. One gramme of the guano is then wrapped tightly in a piece of sized paper, and dropped into the liquid. The cork is immediately inserted into the neck of the flask, and the graduated cylinder so placed, that the water within and without it is at the same level, and a note is made of this point. Then the flask is gently shaken, so as to bring the guano in contact with the liquid; and by the reaction that takes place, nitrogen is liberated, and passes into the graduated cylinder, which is gradually raised, so as to keep the water at the same level within and without. After about two or three hours, if the volume of gas does not appear to increase, the reaction is at an end, and the volume of nitrogen liberated may be ascertained by reading off the increase in the volume of gas in the graduated cylinder. This method gives only an approximative result, since the other nitrogenous constituents, besides ammoniacal salts, are to some extent decomposed by the hypochlorite of lime. Direct experiments have shown that uric acid is partially decomposed by hypochlorite, and nitrogen liberated; but the quantity decomposed rarely exceeded one-half of the quantity operated upon, and was sometimes much less. The concentration and temperature of the solution appears to influence the result.

Relation of Boracic Acid to Tartaric Acid.—It is generally considered that in the compounds of tartaric acid with boracic acid and borax, the boracic acid is in the condition of a base in regard to the tartaric acid. But Professor Rose† believes that there are facts that are inconsistent with this opinion.

Thus, a solution of boracic acid in alcohol burns with a green flame, which is due to the formation of boracic ether; for when the boracic acid is combined with a strong base, it no longer communicates a green colour to the flame of alcohol. In this case the green colour appears only when a strong acid has been added.

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* *Journal für praktische Chemie*, lxxi., 209.

† *Bericht der Akad. der Wissensch. zu Berlin*, 1857, p. 573.

Several organic acids, especially tartaric acid, present the same relation to boracic acid in this respect as strong bases. They prevent it from communicating to the flame of alcohol a green colour. A considerable amount of organic acid is necessary to produce this effect; for each equivalent of boracic acid there must be at least ten equivalents of crystalline tartaric acid. When such a mixture is dissolved in alcohol, the solution does not burn with a green flame. But when sulphuric acid is added to this alcoholic solution, the green colour of the flame reappears in the same manner as when this acid is added to the compounds of boracic acid with strong bases. The various kinds of borotartrate of potash communicate a green colour to the flame of alcohol only when mixed with sulphuric acid.

Among the inorganic acids, phosphoric acid exercises a somewhat similar influence upon boracic acid as tartaric acid does. But a much larger proportion of phosphoric acid is requisite for preventing the green coloration, and by the addition of sulphuric acid it is again restored.

In many attempts to displace the basic water of crystallized tartaric acid by boracic acid, only a negative result was obtained, so that it is inferior in basic character to the water in tartaric acid.

In order to determine with some degree of certainty which of the two acids is to be regarded as the base in their compounds, the action of the galvanic battery was tried. A solution containing boracic acid with ten equivalents of tartaric acid, which did not communicate a green colour to the flame of alcohol, was introduced into the circuit of a battery consisting of two Grove's cells. The poles consisted of strips of platinum, and were separated by a clay cylinder. When after a few hours the solutions surrounding both poles were examined, that which had been in contact with the positive pole, communicated to the flame of alcohol a green colour, but that which had been in contact with the negative pole did not do so until after the addition of sulphuric acid. This result does not well admit of the boracic acid in the compounds of this substance with tartaric acid, being regarded as having the characters of a base.

Racemic acid has in all respects the same relation to boracic acid.

The brown coloration of tumeric paper by boracic acid has been ascribed to the basic character of this substance. But this coloration has no resemblance to that produced by alkalies. This latter takes place directly on immersing the paper; it is then very deep, even when the solution is weak, and decidedly brownish-red, but when the paper is dried, the colour alters and becomes somewhat violet, or if the alkaline solution was very weak it disappears after some time almost entirely. This is the case, for instance, when tumeric paper is dipped into lime water.

On the contrary, the brown coloration produced by a watery or alcoholic solution of boracic acid is not perceptible directly after immersion, but appears only when the paper has been dried. Then it is faintly but characteristically reddish-brown. The coloration is strikingly increased when the solution of boracic acid is mixed with another acid, and then allowed to dry upon tumeric paper. All acids have this influence of the coloration, but the stronger acids, such as hydrochloric, nitric, even tartaric, and especially bihydrated sulphuric acids, are more effective than the weak acids, such as acetic acid. When the paper that has been immersed in such a solution is completely dried, the colour is clearer and very deep red.

The action of a solution of borax upon tumeric paper also shows that the coloration of tumeric paper by alkaline solutions is in no way similar to that produced by boracic acid. Thus, on dipping tumeric paper into a solution of borax, it immediately becomes brownish-red, in the same way as when dipped into a weak alkaline solution. But after the paper has been dried this colour disappears almost entirely, with the exception of an extremely slight coloration due to boracic acid. Thus, the solution of borax exercises almost the same action upon tumeric paper as a weak alkaline solution, such as lime water. If the coloration of tumeric paper by boracic acid and by alkaline solutions were due to similar causes, it would follow that an increased result would be produced by a solution of borax. The action of boracic acid upon tumeric paper dipped into a solution of borax, is, however, rendered very apparent when an acid, especially one of the stronger acids, is added to the solution. The paper acquires then a colour somewhat different from that produced by boracic acid alone, but by this means very small quantities of boracic acid or of borates may be detected.

Boracic is not the only acid which has this peculiar action upon tumeric paper. Titanic acid, tantalic acid, the acids of niobium stannic acid, and zinconia exercise a similar influence, except that most of the effects produced by these acids on tumeric paper are, to some extent, though not considerably, different from those produced by boracic acid.

Constitution of Lactates.—Hr. Brüning has endeavoured to determine whether lactic acid is to be regarded as C_{12} H_{12} O_{12}, and capable of saturating four equivalents of base, or as C_6 H_6 O_6, and capable of saturating only two equivalents of base.

The lactic acid used in these experiments was prepared according to the method recommended by Bensch, and was purified by crystallizing the zinc salt several times.

Lactate of Protoxide of Tin was prepared by mixing solutions of lactate of soda and protochloride of tin. Its composition was found to be C_{12} H_8 O_8+ 4 SnO, and not as Englehardt and Maddrell state, C_{12} H_{10} O_{10} + 4 Sn O, consequently four equivalents of hydrogen are replaced by four equivalents of zinc.

With oxide of mercury no quadribasic salt could be obtained. By saturating a boiling solution of lactic acid with oxide of mercury, as directed by Englehardt and Maddrell, a strong evolution of gas was produced, and an odour of aldehyde was given off. The salt which crystallized out of the solution was a salt of the suboxide of mercury. It did not correspond with the suboxide salt described by Englehardt and Maddrell, but rather with a salt described by these chemists as a protosalt. This salt is colourless, is not decomposed by boiling water, and did not lose water at 212° F.

Analysis gave for this salt the formula C_{12} H_{10} Hg_4 O_{12}.

By saturating lactic acid with hydrated oxide of bismuth, a basic salt was obtained, mixed with the excess of oxide of bismuth. The filtered liquid yielded on evaporation the monobasic bismuth salt, BiO + C_{12} H_9 O_9.

It follows, therefore, that lactic acid can combine with four equivalents of base, although these quadribasic salts are not easily obtained.

By the reaction of pentachloride of phosphorus upon lactic acid, which was for the most part converted into anhydride by simply heating it to about 314° F., a complicated result was obtained. Without any application of heat, chloride of methyl was evolved; and when heat was applied, the contents of the retort blackened, with evolution of much hydrochloric acid and carbonic oxide. The residue contained phosphoric acid, together with anhydrous lactic acid.

In the lactic fermentation there are produced, besides lactic acid, some other products, among which mannite and gum are abundant. The gum first observed by Kirchof was obtained pure by Hr. Brüning, by precipitating lime as sulphate from the clear solution of lactate of lime, obtained by fermentation, and then precipitating the gum with alcohol. The precipitate was several times washed with water acidulated with hydrochloric acid, and purified by repeated precipitation by alcohol. When dried at 314° F., and analyzed, it was found to contain—

			Calculated.
Carbon	44.44	12	43.61
Hydrogen	6.17	10	6.25
Oxygen	49.39	10	50.14
	100.00	32	100.00

This gum produced by fermentation is not identical with either dextrin or arabin. An alkaline solution does not reduce oxide of copper, but a bright blue precipitate is produced, the colour of which is not altered by boiling the liquid. In this particular the gum resembles arabin.

On the other hand, the watery solution turns the plane of polarization to the right, as in the case of dextrine. By the action of nitric acid, no mucic acid is produced.

ON THE CHEMISTRY OF BREAD-MAKING.

BY W. ODLING, M.B., F.C.S.*

In this communication the author proposed, while glancing generally at the phenomena of panification, to direct attention especially to certain changes which the starch and gluten are liable to undergo, and which, although materially affecting the results, have until recently been almost entirely overlooked. Having briefly adverted to the mode of dressing the flour, to fit it for the use of the baker, and described the composition of wheat flour, as determined by a proximate analysis, the author proceeds to say :—

"Until very lately it was considered by scientific men that the high quality of the flour was dependent upon the amount of gluten or flesh-forming material that it contained. But it is now perfectly certain that the bread-making value of flour, and its price in the market, are proportionate—not to the amount of gluten, but to the amount of starch. The finest quality of flour, that obtained from the centre of the grain, is always poorest in azotized constituents. Hitherto starch has been the baker's criterion of excellence ; gluten, the physiologist's ; but Messrs. Lawes and Gilbert have maintained, with considerable reason, that the baker's criterion of excellence is physiologically correct ; or, in other words, that the value of bread as food depends more upon its heat-forming than its flesh-forming function. With regard to the extractives, I think I may safely say that they are inversely proportionate to the good condition of the flour, as is indicated by the analyses. A high per-centage of extractives nearly always indicates some defect in the harvesting or storing of the grain or flour."

The following are the analyses referred to. Nos. I. and II. were fine well-conditioned flours ; No. III., a cheap inferior flour ; and No. IV., a very much damaged flour :—

	No. I.	No. II.	No. III.	No. IV.
Gluten	9.30	10.05	11.81	4.99
Starch	66.55	64.58	62.52	61.21
Extractive	7.47	8.45	12.05	18.23
Water	14.66	15.50	12.85	15.96

We give the remaining part of the paper entire, as it conveys a very clear description of the changes which occur, or are supposed to occur in the production of bread, and of means sometimes resorted to, which have the effect of preventing or modifying some of such changes. The views taken of these changes accord generally with those which have been repeatedly expressed in this journal :—

"In the manufacture of bread from flour, it is usual to employ a ferment, for the purpose of generating, within the substance of the dough, thousands of minute gas bubbles, so that the resulting loaf may prove not a hard, or tough, or clammy mass, according to its degree of moisture, but a soft vesicular and easily digestible substance. Originally, leaven or stale dough was used as the ferment, but for many years past the yeast of beer has been advantageously employed as a substitute, or rather as a partial substitute. Yeast is glutinous matter in a state of change, which state of change it imparts to the gluten of the flour or dough. Independently of any yeast, however, the gluten of dough can, in course of time, attain for itself this particular transformative condition, and it then constitutes leaven. But in the production of leaven, *per se*, the dough simultaneously acquires an offensive sour taste and smell. Now, the panary fermentation consists essentially in the mutual reaction of sugar, and of gluten in a particular state of change. The gluten of yeast and leaven is in this particular state of change, and by mere contact with one or other of these substances the gluten of fresh dough readily acquires a similar state. Hence, one great use of the yeast or leaven is to put the gluten of fresh dough into an active condition, whereby it may exert a transformative or fermentative action upon the sugar. In order to effect the necessary fermentation

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of the sugar, some bakers rely largely upon the gluten of yeast ; but in Paris, more particularly, where bread-baking has arrived at a high state of perfection, it is customary to rely chiefly upon the gluten of the dough, and only to facilitate the action by means of yeast.

"We have now to consider the nature of the change which the active gluten of the dough or yeast effects upon the sugar. Grape sugar or glucose is a body having of itself very little tendency to change. It consists of carbon, hydrogen, and oxygen, and is represented by the formula $C_{12}\ H_{12}\ O_{12}$. The following table shows also the composition of several allied substances :—

"Cane sugar	... $C_{24}\ H_{22}\ O_{22}$, or $C_{12}\ H_{11}\ O_{11}$
Grape sugar	... $C_{12}\ H_{12}\ O_{12} + 2\ H\ O$
Fruit sugar	... $C_{12}\ H_{12}\ O_{12}$
Milk sugar	... $C_{12}\ H_{10}\ O_{10} + 2\ H\ O$
Starch, Dextrine, Leicome, Gum, Woody fibre	$C_{12}\ H_{10}\ O_{10}$

"But the nitrogenized bodies usually classed as proteine compounds—such, for instance, as fibrin, gluten, albumen, and casein, are remarkable for the facility with which they undergo certain spontaneous changes of decomposition ; and these proteine compounds, when in this state of change, are, by mere contact, capable of affecting the condition not only of fresh nitrogenous compounds, but also of grape sugar and other varieties of non-nitrogenous organic matter. The changes induced upon this last description of bodies vary with the nature of the nitrogenized substance employed, and with its degree of decomposition. Thus, stale casein or curd converts sugar first into lactic acid, and eventually into carbonic acid and butyric acid. The active gluten of yeast or leaven converts sugar into alcohol and carbonic acid, as represented in the following diagram :—

"2 alcohol ($C_4\ H_6\ O_2$) =	$C_8\ H_{12}\ O_4$
4 carbonic acid ($C\ O_2$) =	$C_4\ O_8$
1 grape sugar. .... =	$C_{12}\ H_{12}\ O_{12}$

"Pure sugar can in this way be resolved completely into carbonic acid gas and alcohol. The object of the baker in the use of yeast or leaven, is to effect this resolution or fermentation of the saccharine constituents of the wheat within the substance of the dough. A certain quantity of flour is mixed with yeast, salt, and tepid water. This constitutes the sponge, which is covered up and set aside in a warm place, to undergo fermentation. In the course of an hour or so the mass swells up considerably from the generation within its substance of carbonic acid gas, large bubbles of which gradually extend to the surface and burst. With each successive burst we have a sudden falling of the sponge, followed by a gradual rising ; and these alternate actions would, if allowed, continue to take place for many hours. Various other modes of making an active sponge are employed, particularly by the use of potatoes. When the sponge, no matter how formed, is in an efficient condition, the baker mixes up with it fresh portions of flour, salt, and water, which added quantities constitute the great mass of the dough. The whole is then subjected to a thorough kneading, so that the fermenting dough may permeate and affect the entire substance, and thus cause an equable liberation of carbonic acid in every particle. The dough is set aside for a few hours, during which the fermentation proceeds. It is then kneaded a second time and weighed out into loaves, which are allowed to continue fermenting until they have about doubled their original bulk. They are then baked in the oven, within which they undergo a further increase of size. This last increase is due principally to the expansion by heat of the previously evolved gas, for the heat of the oven very speedily arrests the process of fermentation. I have alluded to this fermentation as the panary fermentation. In reality, however, such a phrase is quite unnecessary. We have only the ordinary well-known vinous fermentation of the sugar of wheat into carbonic acid and alcohol, precisely as in making distillers' wash we ferment the sugar of the malt into carbonic acid and alcohol. That the so-called panary fermentation is in reality a vinous fermentation, was, I believe, first satis-

factorily demonstrated by Mr. Graham in the year 1826, from whose paper on the subject I have made the following extract:—'To avoid the use of yeast, which might introduce alcohol, a small quantity of flour was kneaded and allowed to ferment in the usual way, to serve as leaven. By means of the leaven a considerable quantity of flour was fermented, and when the fermentation had arrived at the proper point, formed into a loaf. The loaf was carefully enclosed in a distillatory apparatus, and subjected for a considerable time to the baking temperature. Upon examining the distilled liquid, the taste and smell of alcohol were quite perceptible, and by repeatedly rectifying it, a small quantity of alcohol was obtained, of strength sufficient to burn and to ignite gunpowder by its combustion. The experiment was frequently repeated, and in different bakings the amount of alcohol obtained of the above strength was found to vary from 0.3 to 1.0 per cent. of the flour employed.' About the same time Dr. Colquhoun also found that when fermentation had ceased in a mass of dough, through an exhaustion of the sugar present, the addition of more sugar speedily reinduced the fermentation, precisely as happens in the fermentation of distillers' wash. Many calculations have been made, to show the quantity of alcohol produced in the process of bread-making. These agree tolerably well with the results of Mr. Graham's experiments, the quantity of proof spirit being estimated at less than one per cent. of the flour. Yet the total quantity of alcohol produced must be enormous. It is estimated that the quantity of bread annually consumed in London yields 300,000 gallons of spirit, all of which escapes into the atmosphere. Some years ago the military bakehouse at Chelsea became famous, in consequence of £20,000 having been expended there in the fruitless attempt to collect and condense the alcohol produced.

"The above-described action of the nitrogenized substance, metamorphic gluten, upon the non-nitrogenized substance, sugar, is essential to the manufacture of fermented bread, and is an object of the baker's solicitude. But flour contains other nitrogenized substances than gluten—other non-nitrogenized substances than sugar. These nitrogenized substances, like gluten, readily undergo change, and thereby acquire transformative powers, not only upon sugar and dextrine, but also upon starch. The action of the nitrogenous substance, metamorphic albumen, upon the non-nitrogenous substance, starch, is highly detrimental to the manufacture of bread, and is a result which, wittingly or unwittingly, the baker endeavours to prevent. My attention was first directed to this subject between two and three years ago, when I had brought to me for examination a loaf which was sticky, saccharine, and sodden throughout, but which had been made from apparently good flour. Again, in the autumn of 1856, I received from Tring, in Hertfordshire, a sample of flour which was unadulterated, which contained the usual proportions of gluten, starch, and extractive, the latter being perhaps rather in excess, which seemed to be in good condition, inasmuch as the gluten was highly elastic and expansible by heat, which had in fact only one fault—it would not make bread. The result of the baking was a sweet, sticky, dark-coloured mass. Subsequently, through the kindness of Dr. Hillier, Mr. Pittard, and other friends, I have received several samples of flour having similar characters. Now, in these samples there occurs, during the process of bread-making, an exaggerated degree of the change which always takes place to a slight extent, and which consists in the conversion of the starch into sugar and dextrine. Mr. Warren de la Rue tells me that he has met with samples of flour, in which this transformation of the starch has taken place so rapidly and completely, as altogether to prevent the formation of paste for use in his manufactory. Many years ago Vogel noticed that, in the manufacture of bread from flour, although much sugar was converted into carbonic acid and alcohol, the quantity of the sugar in the loaf nearly equalled that in the flour. But soon after, Mr. Graham and Dr. Colquhoun both showed that, during baking, a portion of the starch of flour was converted into sugar. Now this conversion is due to the presence of some albuminous ferment. We meet with certain metamorphic albuminous or caseous substances, both animal and vegetable, which agree in the circumstance of their being soluble in water, precipitable by alcohol, and inoperative after exposure to a boiling heat. Such, for instance, are the following:—

"Diastase from malt,
Cerealin " bran,
Emulsin " almonds,
Ptyalin " saliva,
Pepsin " mucous membrane,

and many other ill-defined products. Diastase, cerealin, and ptyalin are remarkable for the rapidity with which they convert starch into dextrine and sugar. The finest wheat flour, obtained from the central portion of the grain, consists almost wholly of starch, is very free from azotized substances, and, unless badly harvested or stored, has very little tendency to undergo this change. But coarse flour, obtained from the exterior of the grain, is rich in azotized substances, and more ready to undergo the glucosic deterioration, which is dependent upon an altered condition of the albumen. During the process of germination we always find the albumen of the seed to take on this condition. The process of malting consists in effecting a germination or sprouting of the barley-corn, coincidently with which the albumen of the barley undergoes a change, acquires transformative powers, receives the name of diastase, converts the starch of the seed into sugar, and is capable of effecting the same change upon a large additional quantity of starch. Now, the albumen of all wheat that has undergone a damp harvesting, or that has been sprouted from any subsequent cause, is in the condition of diastase. English wheat is very liable to suffer in this manner, and a large quantity of the wheat imported into London is in a similar condition. Dr. McWilliam, the physician to the Custom House, tells me that it is usual for a lighted candle, let into the hold of a vessel laden with corn, to be extinguished by the carbonic acid resulting from the partial germination of the cargo; and that, only a few weeks back, a man nearly died from sleeping in a cabin in which a wheat cargo was germinating. Now, wheat of this kind yields a flour from which it is scarcely possible to manufacture a presentable loaf, save by the use of some corrective agent. Moreover, when flour made from well-harvested wheat is subsequently exposed to heat and moisture, the albumen becomes metamorphic, and the production of white bread impracticable, owing to the conversion of the starch into sugar. M. Mège Mouries has recently shown that the albuminous constituent of bran is very ready to undergo metamorphosis, and to acquire transformative powers. To the substance in this condition he has given the name of cerealin, which, however, appears to be identical, or very nearly identical, with ordinary diastase. He shows clearly that the brown colour of bread made with pollard or fine bran is not due to the particles of bran, but to the circumstance of the cerealin effecting a conversion of the starch into dextrine or sugar. When this conversion was prevented by means presently to be described, the bran bread had a very pale orange colour, quite different to that of ordinary brown bread made by the usual method. The crumb of the bread was coloured yellow, merely by the small particles of bran disseminated through the mass.

"In confirmation of M. Mège Mouries' views, a fact is recorded by Chevreul, in his report on the subject, to the effect that 'a method was proposed to the French Government, by means of which the whole of the flour in wheat was to be converted into white bread. This method consisted in removing the coloured skin of the grain, and it was supposed, in accordance with the prevailing opinion, that when all the coloured portions of the grain were separated, the bread obtained would be white. This method was tried, and, to the astonishment of all parties, the bread obtained was brown.' The whiteness of bread does not depend solely upon the whiteness of the flour, but in great measure upon the little degree of change which the starch undergoes in baking. I have taken the finest flour, which in the ordinary way yielded unexceptionable bread, and have had it kneaded with infusions of bran and malt instead of water. The resulting loaves have corresponded exactly with those made from sprouted wheat in being brown, sticky, sweet, and scarcely eatable, owing to the conversion of the white starch into a brown sticky mixture of dextrine and sugar. In bread of good quality, the starch has undergone very little alteration. A portion of it is rendered soluble in water, but the great majority of the granules are simply swollen, not burst, and may be washed out of the bread, collected, and weighed. Vogel gives the following analysis of a wheat bread loaf:—

" Sugar	3.6
Altered starch	18.0
Unaltered starch	53.5
Gluten, with some starch	20.7
	95.8

"I have never estimated the amount of unaltered starch in bread, but I have frequently collected it and examined it microscopically.

"Between the most perfect flours and such sprouted specimens as cannot of themselves be manufactured into a saleable bread, we have innumerable intermediate varieties. Now, it is not by any means certain that the glucogenic varieties of flour are of necessity inferior to the finest flour in their nutritive and digestive properties. There is reason to believe that all starch in its passage through the alimentary canal becomes converted into glucose or an allied substance; and there is no reason to believe that the commencement of this change out of the body is in any degree objectionable. But these flours, in proportion to their glucogenic tendencies, do not make good bread, and it becomes an object with the baker to oppose the glucogenesis as much as possible. Hence, in making bread from certain kinds of flour, he finds it necessary to add alum, or lime, or bean-meal, or some corrective substance which, from experience, he knows will cause the flour to yield a loaf presentable to the eye and agreeable to the palate. In reference to the so-called adulteration of bread with alum, I need scarcely remind the members of the Society of Arts that they are not required to believe everything they have heard from the lips of gentlemen who, gasping for notoriety, have raised a popular clamour on the subject, have ascribed to themselves exclusive knowledge, and claimed for themselves instinctive infallibility. On scarcely any topic, perhaps, has there been expended so much bad chemistry, loose speculation, and, I fear, groundless defamation, as upon that of alum in bread. One gentleman, who, from his vast knowledge, felt himself impelled to write a book on the subject, describes in great detail not only how he found alum in bread, but also how he ascertained the quantity, and that by a process which could not possibly have yielded him a single particle. Another gentleman, probably of greater knowledge, inasmuch as he was impelled to write two books instead of one, disclaims altogether the process above alluded to, but bolsters up his own demands on public credulity by quoting the monstrous results obtained by its means. His predecessor, when he wished to weigh alumina, weighed a something or other without any alumina whatever; but he, more wise in his generation, does not omit the alumina, but takes care to weigh it with a good deal of something else in addition. When in a court of law a scientific witness affirms that he has detected arsenic, he is required to show that the results he obtained could not be due to any other substance than arsenic. But the alum detector of the present day contents himself with getting a whitish precipitate, which may be alumina or may be something else. Why should he trouble himself about a baker's reputation? The means for detecting and estimating alumina are of course equally certain with those for detecting and estimating arsenic; but I know of no book, devoted to food adulteration, in which a satisfactory process is given, though I admit that, in some of these books, the processes are so loosely described, as to leave the authors a loophole of escape from the charge of positive error.

"In illustration of the above statement, I beg to direct your attention to the following table, which exhibits the results of an examination of wheat grain and other vegetable produce :—

	Number of Samples Examined.	Grains of Ash used.	Precipitates formed.
Wheat	23	49 to 100	10
Bran	1	25	1
Maize	1	52.1	0
Barley	3	50	0
Wheat Straw	6	100	6
Barley Straw	3	100	0
Mangold-wurtzel bulb	2	100	0
Swede turnip bulb	3	50	0
Swede turnip leaf	4	25 to 54	4

"The ashes were all kindly furnished me by Dr. Gilbert. The incinerations were made at the Rothamstead laboratory, and all who are acquainted with that laboratory, must acknowledge the great care with which every operation is there conducted.

"My object was to ascertain whether the process usually recommended for the

detection of alum in bread, would not also detect alum in wheat grain and other vegetable produce that could not possibly be adulterated. The process I adopted is that known as Kuhlmann's, which is described as follows: I quote from Mitchell's 'Treatise on the Falsifications of Food.' 'Incinerate about half a pound (3500 grains) of bread in a crucible, and after having pulverized the ash, treat it with nitric acid. Evaporate the mixture nearly to dryness, dilute with about half an ounce of water (distilled), and add to the whole an excess of caustic potash solution; boil and filter; neutralize the filtered liquid with hydrochloric acid, and add a slight excess of ammonia. Collect the alumina thus precipitated in a filter, wash, dry, ignite, and weigh it. Every 100 grains of alumina correspond to about 467 grains of alum.' Now, this is the process I adopted in my examination of the above ashes, save that in many cases I employed hydrochloric instead of nitric acid, such being, I believe, the usual practice, and what was the result? Why, out of forty-six examinations, I obtained in twenty-one instances the celebrated white precipitate, said to be indicative of alumina and alum; so that had these samples been in a manufactured instead of the natural state, had the wheat, for instance, been made into flour, I should have been justified, according to the authority quoted, in pronouncing it to be adulterated with alum. But a subsequent examination of the precipitates I obtained, showed that in reality they were not due to alumina at all. M. Kuhlmann's process, as above described, is possessed of rare merits. It will never fail in detecting alumina when present, and will often succeed in detecting it when absent also. The idea of weighing this *olla podrida* of a precipitate, and from its weight calculating the amount of alum present, as is gravely recommended by great anti-adulteration adepts, is too preposterous to require a moment's refutation.

"Last year a London Physician wrote a letter to the *Lancet*, wherein he stated he had found nearly an ounce and a half of alum in a 4 lb. loaf obtained from a very noted baker, being at the rate of 8lbs. of alum to a sack of flour; and yet the ash of this bread amounted only to 1.17 per cent., including more than 0.5 per cent. of common salt. The ash of 500 grains of bread, in which 11.37 grains of alum were detected, yielded him only 1.4 grains of sulphate of baryta, though every Chemist knows it ought to have yielded more than 11 grains, inasmuch as a grain of alum furnishes very nearly a grain of sulphate of baryta; and the presence of so much common salt of course negatives the notion that sulphuric acid had been expelled to any great extent by the incineration.

"If we have had curious methods described for the detection of alum, we have also had curious statements as to the chemical effects which it produces. About twelve months ago, a very ingenious friend of mine published a report on the subject of alum in bread, and a still more ingenious gentleman so highly approved of it, that he caused the major part to be published in divers newspapers, with his own name appended at the bottom in the large capitals usually considered indicative of authorship. Well, in each of these Siamese-twin reports—for the second had no separate individuality—we have the following daringly-imaginative explanation of the effect of alum in panification:—'The chemical action of alum on moistened flour is analogous to tanning, and destroys (*pro-tanto*) a considerable portion of its nutritiveness by converting it into a kind of wash-leather, or spongy india-rubber. This gives it a tenacity, or toughness and firmness, enabling it to retain the thousands of little bubbles (given off by the yeast) which constitute the lightness or sponginess of the bread.' I should have much liked to have shown the members of the Society of Arts some of this wonderful spongy, india-rubber, wash-leather gluten, which two gentlemen, unknown to one another, were clever enough to obtain from alumed bread. Unfortunately, however, my own experiments for its preparation were not crowned with success.

"Now, from actual experiment, not from speculation, I think myself justified in saying that one very important use of alum is to prevent any undue deterioration of the starch during the process of raising and baking. If we mix a solution of starch with infusion of malt, in the course of a few minutes only the starch can be no longer detected, being completely converted into dextrine and sugar; but the addition of a very small quantity of alum either prevents altogether, or greatly retards, the transformation. The action of diastase upon undissolved starch is very gradual, but here also the interference of the alum is easily recognizable. Bread made with infusion of bran or infusion of malt is very sweet, sodden, brown-coloured, and so sticky as almost to bind the jaws together during its mastication. But the addition

of alum to the dough causes the loaves to be white, dry, elastic, crumbly, and unobjectionable, both as to taste and appearance. I have found that flour, which of itself was so glucogenic as to yield bread undistinguishable from that made with infusion of malt, could, by the addition of alum, be made to furnish a white, dry, crumbly, eatable loaf. Dr. Hillier, if present, will probably remember my sending him two loaves made from a sample of glucogenic flour with which he had supplied me; the one, without alum, being brown, wet, sweet, and sticky, the other, with alum, being white, dry, crumbly, and unobjectionable. The specimens on the table exhibit the same differences in appearance. Of course, the worse the character of the bread which the flour yields *per se*, the more striking the effect of the alum. Now, that alum does oppose the transformation of starch into sugar during the process of bread-making, is indisputable, and this action is quite sufficient to account for the whiteness, the dryness, and the non-adhesiveness that result from its employment.

"Alum is said to have the power of causing bread to retain a larger proportion of water than it otherwise would. Thus, one witness, before the Select Parliamentary Committee on the Adulteration of Food, said, 'Supposing it could be proved that the presence of alum in bread is not directly injurious to health in any way, yet certain objections would still remain to the employment of alum; one of those objections is, that it causes the bread to hold more water than it would otherwise do, and, of course, the greater the quantity of water the less the quantity of wheat flour.' And another witness said that 'bakers who used alum defrauded their customers by selling water at the price of bread.' These statements certainly do not accord with my experience. I once examined the new crumb of eighteen alumed loaves, and found as a mean result 43.68 per cent. of water. I also examined, in a precisely similar manner, the crumb of seven non-alumed loaves, and found as a mean result 42.78 per cent. of water, the difference being quite insignificant as compared with the differences which subsist between the individual loaves, whether alumed or not.

"The table given on the next page shows the detailed results. The specimens marked with asterisks did not contain alum. The table also gives the per-centages of nitrogen and ash. The loaves were all two-pound loaves, obtained new, that is to say, during the day on which they were baked. The top crust of each loaf was sliced off, and then a layer, about two inches thick, removed, trimmed at the edges, and submitted at once to examination. My estimations of water accord closely with those of Payen and Johnston, but are somewhat higher than those of Lawes and Gilbert, of Maclagan, and of Christison. The mean of my nitrogen determinations corresponds closely with the results of Lawes and Gilbert, Maclagan, Playfair, and Payen.

"Another reputed effect of alum is to prevent the loaves turning sour or mouldy. On this point I have no experience to lay before the Society. M. Mège Mouries lays considerable stress upon the fact, that when the fermentative action of the gluten preponderates, we have sugar converted into carbonic acid and alcohol, as is desirable; but that when the fermentative action of cerealin, and, I would add, of diastase, preponderates, we have starch converted into dextrine, sugar, and lactic acid, as is most undesirable. We should infer chemically that alum, by preventing the transformation of starch, would prevent or interfere with the production of lactic acid, which seems to be produced in recognizable quantity when bread is made from inferior flour. Some of my friends, who make their own bread, have informed me that alum is necessary to prevent mouldiness, and evidence to the same effect was given before the Parliamentary Committee. We know that alum is usually added to flour paste to make it keep, but whether its preservative power depends upon its preventing the paste from liquefying by an alteration of its starch, or merely upon its preventing mouldiness, I am unable to say.

"Liebig's explanation of the effect of alum in panification, corresponds as far as it goes with that which I have had the honour of presenting to your notice. Liebig says that in damp flour there is produced, by a reaction of the gluten and starch, acetic and lactic acids, which render the gluten soluble in water, and that alum and other mineral salts render this gluten again insoluble. Although Liebig referred specially to the dissolved gluten, I have no doubt he really meant to include all the dissolved proteine or albuminoid substances, including, of course, the diastase and cerealin. But he does not seem to have deduced, or, at any rate, he has not referred to the consequence which would necessarily arise from this action, namely, the prevention of the metamorphosis of the starch during baking. Payen seems to entertain

	Price in Pence.	Percentage of Water.	Percentage of Organic Matter.	Percentage of Mineral Matter or Ash.	Percentage of Ash in Dry Bread.	Percentage of Nitrogen in New Bread.	Percentage of Nitrogen in Dry Bread.
1	$4\frac{3}{4}$	43.03	55.48	1.49	2.61	1.83	3.21
2	$3\frac{1}{2}$	42.86	56.07	1.07	1.87	1.47	2.57
3	$3\frac{1}{2}$	44.81	53.74	1.45	2.62	1.89	3.42
4	$3\frac{1}{2}$	46.71	52.12	1.17	2.19	1.14	2.13
5	4	45.42	53.24	1.34	2.45	1.66	3.05
6	4	44.33	54.29	1.38	2.47	1.04	1.88
7*	4	44.41	54.38	1.21	2.17	1.06	1.90
8	$3\frac{3}{4}$	38.62	59.79	1.59	2.58	1.15	1.47
9*	$3\frac{3}{4}$	42.77	56.00	1.23	2.15	1.31	2.29
10	4	43.67	55.09	1.24	2.20	0.93	1.66
11*	$4\frac{1}{2}$	42.94	55.82	1.24	2.17	1.12	1.95
12	$3\frac{1}{4}$	44.20	54.61	1.19	2.13	1.14	2.05
13	4	45.12	53.55	1.33	2.4	1.17	2.15
14	$3\frac{1}{2}$	44.34	54.41	1.25	2.28	1.23	2.21
15	4	43.70	55.07	1.23	2.18	1.01	1.81
16	$4\frac{3}{4}$	43.06	55.59	1.35	2.39	1.24	2.18
17	4	43.90	54.92	1.18	2.11	1.13	2.03
18	4	42.12	56.65	1.23	2.12	1.23	2.14
19	$4\frac{3}{4}$	42.58	55.99	1.43	2.50	1.34	2.34
20*	$4\frac{3}{4}$	41.06	57.23	1.71	2.90	1.39	2.38
21*	$4\frac{1}{2}$	44.07	54.67	1.26	2.26	1.08	1.94
22	4	44.46	54.22	1.32	2.38	1.18	2.14
23	$4\frac{3}{4}$	43.43	55.24	1.33	2.35	1.19	2.10
24*	$4\frac{1}{2}$	42.89	55.68	1.43	2.52	1.17	2.05
25*	4	41.34	57.76	0.90	1.54	1.33	2.27
Mean	4	1085.84	1381.61	32.55	57.57	31.53	55.72
		43.43	55.26	1.30	2.30	1.26	2.22

the same idea as Liebig. He says that 'when wheat has been badly kept, or when the moist flour has become altered during its warehousing or transport, from three to six thousandths of alum are occasionally added, so as, in some degree, to restore to the gluten the consistency that it has lost.' In the absence of any evidence, either from fair inference or direct observation, that the introduction of small quantities of alum into bread is prejudicial to health, it seems that the practice is not so reprehensible as is usually maintained. It certainly improves greatly the quality of bread made from inferior flour, and, in a politico-economical point of view, is important, inasmuch as it renders a large quantity of flour suitable for human food in the form of bread, which flour would otherwise have to be devoted to less important uses.

"Another chemical agent, namely, lime-water, has been recommended, to effect the same result as that now accomplished by means of alum. This substance was originally recommended by Liebig, and has been used, I believe, to a considerable extent by the Glasgow bakers. Now, I would seriously advise London bakers to give lime-water a full and fair trial. Of course they know exactly how to use alum, and they would have to learn by experience how to use lime. Hence, if their earlier trials are not completely successful, they should nevertheless persevere. From laboratory experiments I find that lime-water acts quite as efficaciously as alum in preventing the action of diastase, and the consequent transformation of starch into sugar. It seems to have scarcely any action upon the fermentation induced by yeast, or at any rate a much less action than alum, which undoubtedly retards the process somewhat. It yields a very white, agreeable bread, having a rather more porous texture than ordinary bakers' loaves, and being quite free from any sourness of taste or smell. The acidity of dough, independently of its obvious disadvantages, facilitates greatly the deterioration of the starch. Starch is always converted into

dextrine by a sufficient elevation of temperature—about 320° Fahr., and hence the crust of bread usually contains as much dextrine as starch. But the presence of a small quantity of free acid enables the transformation to be effected at a lower temperature, and two processes are now followed for the manufacture of dextrine upon this principle—that of M. Payen who uses nitric acid, and that of Mr. Crace Calvert who uses sour butter-milk, the acidity of which is probably due to the same substance as is that of dough, namely to lactic acid. While strongly recommending the use of lime-water, I yet fear that in the practical operations of the bakery, it will prove not quite so effectual as alum in improving very inferior flour, and chiefly because it will not be possible to introduce so large a quantity into a loaf, inasmuch as a pint of water can only dissolve about 12 grains of lime. Of course the use of lime-water will constitute an adulteration, and be stigmatized as highly immoral, inasmuch as it will enable the baker to improve the appearance of an inferior flour. Moreover, although recommended by Liebig, it will render the phosphates insoluble, and so be open to another whimsical objection. But the detection of this adulteration with lime, will, I conceive be more of a puzzle to those gentlemen who have played with the alum-question, and who have not thought it immoral to palm off their bad chemistry as a very superior article. There are, doubtless, many other mineral salts that have the same kind of action as alum, though different in degree. Thus sulphate of copper, seems to act very powerfully. I have found the addition of sulphate of zinc to yield a very white loaf, and even gypsum is not altogether without effect. An admixture of bean meal is said to exert the same action on the flour of badly-harvested wheat as is exerted by alum. Dr. Gilbert informs me that such is really the case, but it is a point on which I have no personal experience. M. Mège Mouries, in his new process of bread-making, whereby all the meal of wheat is to be converted into wheat bread, effects the neutralization of the cerealin by fermenting the brown meal with water in which sugar and yeast have been subjected to the alcoholic fermentation. This process prevents wholly, or to a great extent, the lactic acid fermentation that would otherwise be induced by the cerealin, and it also makes the bran to be thoroughly separated from the meal adhering to it. Then the white flour is kneaded with the fermented liquid which contains the sediment of flour separated from the bran, so as to produce a mass of dough which represents the whole farinaceous portion of the wheat. By the process of M. Mège Mouries, the deterioration of the starch is said to be prevented, and the yield of white bread from a given weight of wheat largely increased, inasmuch as the whole of the wheat is eventually separated into two products only, namely, the coarse bran and the fine bread. The processes are fully described in the *Comptes Rendus* for January 12th, 1857, and a very excellent abstract was published in the *Pharmaceutical Journal* for November, 1857. And now, in conclusion, I have only to thank you for your kind attention, and to express a hope that I have succeeded in rendering a common-place subject not wholly uninteresting or uninstructive.

ON SOME CONSTITUENTS OF RHUBARB.

BY WARREN DE LA RUE, Ph.D., F.R.S., TREAS. C.S., AND HUGO MÜLLER, Ph.D.

I.—*Investigation of a Deposit found in Tincture of Rhubarb.*

It has been often observed, that when freshly prepared tincture of rhubarb is left to itself for some time, it becomes turbid, and deposits a dark-coloured precipitate, which cannot be redissolved, either by heating the tincture or by diluting it with fresh alcohol. The attention of the Society was recently called to this circumstance by Mr. Whipple, who frequently has occasion to prepare the tincture of rhubarb on a large scale: Mr. Whipple, at the same time, gave an account of a few experiments he had made with the precipitate, and stated that his leisure did not permit of his investigating the subject further, but that he would furnish material to any member who might feel inclined to pursue the inquiry. As it appeared to be very probable that the deposit from the *tinctura rhei* contained some constituents of interest, we availed ourselves of Mr. Whipple's offer; and we take this opportunity to express to him our thanks for the liberal supply of material which he kindly placed at our disposal.

The deposit from rhubarb tincture is of a dark colour, and resinous nature; it resembles logwood extract coarsely powdered, and has in a slight degree the

characteristic odour of rhubarb. When heated in a test-tube, it does not melt, but gives off yellow fumes, which condense to a yellow liquid, a black residue being left. Heated on platinum foil, it burns without melting, leaving a tolerably large quantity of ash, which consists principally of potash and lime. Boiled with water, it imparts a yellowish tint to it, but an almost inappreciable quantity of it is dissolved: alcohol, when boiled with the precipitate, assumes a dark yellow-brown tint, but the quantity dissolved is, nevertheless, very small. Similar results are obtained on treating the precipitate with ether, chloroform, and glacial acetic acid. Ammonia and concentrated sulphuric acid dissolve the greater part, but not the whole of the substance; the fixed alkalies, on the other hand, when aided by heat, completely dissolve it, with the exception of a slight residue, consisting of accidental impurities: the solution in ammonia, the alkalies, or sulphuric acid, is of a dark, dingy purple colour.

After having determined the leading properties of the deposit by the above-named experiments, its composition was investigated in the following manner:—A considerable quantity of the substance was pulverized as finely as possible, and treated repeatedly with boiling spirit of wine (of 86 per cent.), until it no longer dissolved anything; the insoluble residue, which constituted by far the greater bulk of the deposit, will be treated of hereafter. The dark yellow solution was filtered while hot, and concentrated by partially distilling off the alcohol; the concentrated solution, on cooling, deposited a flocculent matter of yellow colour. This deposit, after being several times dissolved in alcohol, and allowed to deposit therefrom, became crystalline, and exhibited all the properties of *Chrysophane.*

In accordance with the method adopted by Schlossberger and Döpping,* in their analysis of rhubarb, the mother-liquor of the chrysophane was mixed with about an equal volume of ether, when a bulky brown precipitate was formed. This was allowed to stand for a while, and the clear supernatant liquor tested with a fresh portion of ether, in order to ascertain whether any more precipitate could be thrown down. After the precipitation was ascertained to be complete, the deposit was separated by filtration, and set aside. The filtrate was concentrated by distilling off the greater part of the ether, and was then allowed to evaporate spontaneously to dryness. The dry residue was again dissolved in alcohol, and the solution treated with ether, which again caused a precipitation; the filtered solution was then concentrated, and allowed to evaporate to dryness; and these operations were repeated as long as ether caused any precipitate in the alcoholic solution. Lastly, by evaporating the alcoholic solution to dryness, we obtained a small quantity of a substance which did not show any signs of crystallization; it had a brown resin-like appearance, and when powdered became yellow; it dissolved readily, with a turmeric tint, in alcohol, ether, and benzol, and gave a deep red solution with ammonia and the fixed alkalies, and exhibited the other characteristic properties of *Erythroretin.*

The brown deposit separated by ether from the solution of erythroretin, after repeated solution in alcohol and precipitation with ether, resembles in all its properties the *Phæoretin* of Schlossberger and Döpping.

It will be recollected that we stated that the greater part of the deposit from the tincture of rhubarb, when treated with alcohol to remove chrysophane, erythroretin, and phæoretin, remained undissolved; by digesting this residue with a moderately strong solution of caustic potash, it dissolved completely, giving a dark brownish-red solution. To the alkaline solution hydrochloric acid was added; this caused the separation of a deep brown precipitate, which was first washed with water, then with alcohol, to remove a portion of phæoretin which it still contained. After drying, the precipitate formed an almost black resinous substance, nearly insoluble in alcohol, ether, chloroform, and benzol; but dissolving readily in the alkalies. When heated on a platinum foil, it takes fire without melting. These properties accord with those of the *Aporetin* of Schlossberger and Döpping.

These experiments tend to show that the deposit which forms in the tincture of rhubarb is composed chiefly of—

Chrysophane,
Erythroretin,
Phæoretin,
Aporetin;

* *Ann. Ch. Pharm.*, l., 219.

the chief constituents being the last named. The chrysophane amounts to about 4 per cent., and hence the rhubarb-tincture deposit is a valuable material for its preparation.

II.—*Preparation of Chrysophane.*

The investigations of the deposit of the "Tinctura Rhei" afforded us an opportunity of studying the properties of chrysophane in connexion with the other constituents of the rhubarb root, and enabled us to devise a method for the preparation of chrysophane, which completely removes the difficulties hitherto experienced in the extraction of that substance from rhubarb. Having observed that chrysophane is only slightly soluble in alcohol, but that it dissolves readily in glacial acetic acid, amyl-alcohol, oil of turpentine, coal naphtha, and especially in benzol, and in the lighter oils obtained from Burmese naphtha, to the exclusion of the greater part of the other constituents, it became apparent that the latter solvents might be used with great advantage in its preparation. A few preliminary experiments led to the selection of benzol,* or the light oils of Burmese naphtha and of amyl-alcohol, as the best suited for the purpose. The deposit of the "Tinctura Rhei" parts readily with its chrysophane when treated in a finely-powdered state with benzol (purified coal-tar naphtha may be substituted), in a Mohr's extraction apparatus. In order to prepare chrysophane from rhubarb itself, a preliminary operation is necessary; the crushed root must be previously macerated with cold water, which removes more than 50 per cent. of soluble matter; these not only unnecessarily increase the bulk of material to be operated on, but they also render the extraction of the chrysophane much more difficult. After maceration with water, the root is dried and treated with benzol in a Mohr's apparatus. By operating in the manner described, a very concentrated solution of chrysophane is obtained, and a comparatively small quantity of the solvent is employed.

The fact that chrysophane is but slightly soluble in alcohol, and much less so in the dilute alcohol employed in the preparation of the tincture of rhubarb, led to the conjecture that the greater part of the chrysophane remains in the residuary root. An experiment, carried out with such residuary rhubarb as is thrown away in pharmaceutical laboratories, proved this conjecture to be well founded, as the residue furnished 2.6 per cent. of chrysophane. It is, indeed, better suited for treatment with benzol than the original root, in consequence of its not being necessary to macerate it previously with water.

The benzolic solution obtained from either of the above-named sources is concentrated by distilling off the greater part of the benzol; on cooling, the solution becomes nearly solid by depositing the crude chrysophane. The mother-liquor contains erythroretin and a neutral fat, and it is advisable to sacrifice the small quantity of chrysophane retained in the mother-liquor, by at once pressing the crude chrysophane between blotting-paper.

On re-dissolving the crude chrysophane in hot benzol, a reddish-yellow and much less soluble body is left undissolved, and the hot solution, on slightly cooling, deposits a still further quantity of it in the state of a light flocculent precipitate. The chrysophane is obtained by crystallization, after filtering off the flocculent matter, and concentration of the solution. In order to obtain the chrysophane quite pure, the operation must be repeated several times. The flocculent precipitate proved to be a new body, which appears to have escaped the notice of previous investigators of rhubarb.

In the final purification of chrysophane, both amyl-alcohol and glacial acetic acid offer advantages over benzol; for although it is possible to obtain that substance in beautiful crystals from a benzolic solution, yet the difficulties are less when either amyl-alcohol or acetic acid is employed, in consequence of temperature affecting the solvent powers of these latter agents to a greater extent than those of benzol.

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* Benzol and the light hydrocarbons obtained from Burmese naphtha appear to be susceptible of a very general application in experimental research, as they are of great value in separating certain classes of bodies from others of a different nature. As examples of this application, we may state that benzoic acid can be readily separated from gum benzoin by means of benzol; guaiacic acid can also be separated by its means from gum guaiacum, the benzol dissolving the acids and leaving the gum unacted upon; on evaporation, the acids are obtained at once in remarkably fine crystals.

Although alcohol is not adapted for the extraction of chrysophane, it may be nevertheless used in the final crystallization with advantage.

Pure chrysophane, when crystallized from benzol under favourable circumstances, forms six-sided plates (monoclinic prisms), which bear great resemblance to iodide of lead; the colour varies from a pale yellow to a deep orange, according to the size of the crystals. From alcohol, amyl-alcohol, and glacial acetic acid, it usually crystallizes in moss-like aggregations of foliated crystals. It dissolves in 224 parts of boiling alcohol of 86 per cent., and in 1125 parts of alcohol at 30° C. (86° F.). When pure, it melts, without decomposition, at 162° C. (323°.6 F.), and solidifies, on cooling, to a crystalline mass.

Although chrysophane dissolves in alkalies, forming definite compounds, its acid properties are very feeble; for it not only does not drive off carbonic acid from its combinations, but even parts with ammonia, when the ammonia compound is evaporated.

It is well known, that when chrysophane is dissolved in caustic potash of moderate strength, a beautiful purple compound is formed, the greater part of which remains in solution, but a portion of it gradually deposits as a flocculent precipitate. We have observed, that if grape-sugar be added to the compound containing an excess of alkali, and the mixture kept for some hours in a well-stoppered bottle, the purple colour gradually disappears, and the solution becomes of a brownish-yellow tint, this phenomenon being accompanied by the disappearance of the flocculent precipitate. The solution, however, recovers its original purple colour when exposed in a shallow vessel to the air for a few minutes, and the flocculent precipitate is again formed.

Hydrate of potash, at its fusion point, does not alter chrysophane at first; but if the temperature be raised, or the action continued for some time, it first becomes blue, and is then decomposed, at the same time an odour resembling that of caprylic alcohol is emitted. Potassium alcohol apparently does not destroy chrysophane; it gives rise to a purple compound and formation of alcohol.

Neither chlorine, bromine, nor nitric acid, destroys the yellow colour of chrysophane; but they undoubtedly alter its composition. Nitromuriatic acid, when boiled for some time with chrysophane, forms a liquid body which does not become crystalline on cooling; but it still retains the property of striking a red colour with caustic alkalies. A mixture of hydrochloric acid and chlorate of potash behaves in a somewhat similar manner. If chrysophane be dissolved in strong sulphuric acid, and peroxide of manganese be then added, the red colour disappears, in consequence of the destruction of the chrysophane.

0.1426 gramme of chrysophane gave on combustion:—
0.3595 gramme of carbonic acid = 68.76 per cent. carbon.
0.0545 gramme of water = 4.25 " hydrogen.

If these numbers be compared with those obtained by Rochleder and Held, who analyzed the substance obtained from the lichen *Parmelia parietina*, and by Schlossberger and Döpping, who analyzed the chrysophane of rhubarb, there will be found a perfect accordance in the results, as will be seen from the following table:—

	Rochleder and Heldt. I.	Rochleder and Heldt. II.	Schlossberger and Döpping.	De la Rue and Müller.
Carbon	68.45	68.65	68.69	68.76
Hydrogen	4.56	4.59	4.24	4.25
Oxygen	26.99	26.76	27.07	27.09

Before concluding these observations respecting chrysophane, we are desirous of calling attention to the remarkable resemblance existing between the properties of that body and pipitzahoëinic acid prepared from a Mexican root called *raiz del pipitzahuac*, and described by Weld;* but the analysis differs too much to admit of the two bodies being considered identical.

Weld obtained the following numbers:—

	I.	II.
Carbon	72.58	73.24
Hydrogen	8.06	8.27

From the foregoing numbers, Weld derives the formula $C_{30}\ H_{20}\ O_6$. Rochleder and

* *Ann. Ch. Pharm.*, xcv., 188.

Heldt's formula for chrysophane is C_{20} H_8 O_6, making a difference in the composition of the bodies of C_{10} H_{12}.

We cannot refrain from pointing out the possibility of these two bodies being homologues, and differing by 5 (C_2H_2) ; this would make the formula of pipitzahoëinic acid to be C_{30} H_{18} O_6, which requires 73.17 carbon and 7.31 hydrogen.

III.—*Emodin.*

In the description of the preparation of chrysophane, it was mentioned that on treating the crude chrysophane with benzol, there is left undissolved a yellowish-red residue, and that a further quantity taken up by the hot benzol is deposited as the benzolic solution of the chrysophane becomes somewhat cooled. Although the insolubility of this body in benzol led to its detection, the complete separation of it from chrysophane is attended with many difficulties, on account of the latter substance modifying to a considerable extent the properties of the new body.

The best mode of separating the new body from chrysophane is to dissolve the precipitate entirely in hot benzol, and to allow the benzolic solution to cool slowly; the deposit which forms is then separated by filtration, and dissolved by heat in glacial acetic acid, from which it is obtained, in a state of considerable purity, and in beautiful crystals, as the solution cools. This treatment with acetic acid appears to be essential, on account of its removing some foreign matter, the presence of which interferes with the crystallization.

After purification in the foregoing manner, the new body may be dissolved in boiling alcohol, from which it separates on cooling in splendid prismatic crystals, sometimes two inches long, associated in concentric aggregations.

This substance, for which for the present we propose the name of *Emodin*, is of a bright deep orange colour ; in thick crystals it assumes almost a red tint. The crystals are monoclinic prisms, extremely brittle, and resembling isatin in appearance.

Emodin does not melt at a temperature below 250° C. (482° F.), while chrysophane melts at 162° C. (323.6 F.) ; during the fusion, a small portion volatilizes undecomposed, giving a yellow vapour, which first condenses to a yellow liquid, and subsequently solidifies to a crystalline mass.

In its chemical properties, emodin closely resembles chrysophane, the different behaviour to some solvents being the principal distinction between them. Emodin is much more soluble than chrysophane in alcohol, glacial acetic acid, and amylic alcohol. In benzol, however, emodin is much less soluble than chrysophane ; hence the value of the solvent in the separation of the two bodies.

Caustic alkalies dissolve emodin with the same phenomena as occur in the solution of chrysophane, and ammonia behaves to it as it does to the latter substance, giving a purple liquid, and flying off completely on evaporation of the solution.

On combustion, emodin gave the following numbers :—

I. 0.165 gramme substance gave :—
0.4035 " Carbonic acid = 66.69 Carbon.
0.0605 " Water = 4.07 Hydrogen.

II. 0.1688 gramme substance gave :—
0.4120 " Carbonic acid = 66.57 Carbon.
0.0603 " Water = 4.13 Hydrogen.

The purely empirical formula C_{40} H_{15} O_{13} agrees well with the foregoing analysis, as will be seen from the following table:—

	Theory.		Experiment.		Mean.
			I.	II.	
C_{40}	240	66.85	66.69	66.57	66.63
H_{15}	15	4.18	4.07	4.13	4.10
O_{13}	104	28.97	...	...	29.27
	359	100.00			100.00

Up to the present time we have not been able to determine any rational formula for emodin.

IV.—*Action of Nitric Acid on Aporetin.*

When crude aporetin (that which we used for these experiments contained

phæoretin) is brought in contact with concentrated nitric acid, a red-brown solution is formed, which generates heat, and, evolving nitrous fumes, undergoes further decomposition ; if, after the evolution of nitrous fumes has somewhat ceased, the action be assisted by heat, taking care that an excess of nitric acid is present, it will be observed, after boiling the mixture for several hours, that a yellow substance deposits, and that a further quantity may be obtained on the addition of water to the solution after it has become cold. This yellow body is a nitro-compound of acid properties, and is the principal product of the action of nitric acid on aporetin.

The mother-liquor is of a dark yellow colour, and gives, on evaporation (which is facilitated by adding, from time to time, small quantities of alcohol, in order to carry off the nitric acid), a considerable quantity of oxalic acid, coloured yellow with extraneous matter.

The liquor from which the oxalic acid has been separated, gives with alkalies brownish-red tints, in consequence of the formation of salts with an acid still to be examined.

No picric or styphnic acid could be detected among the products of the action of nitric acid on aporetin.

If the yellow nitro-compound is washed on a filter with water, the latter acquires, after some time, an amaranth-red colour ; if the washing be continued with considerable quantities of water, it still continues to acquire a deep red colour, without diminishing materially the bulk of the nitro-compound.

Boiling water and boiling alcohol dissolve the nitro-compound, and acquire a red colour, but the nitro-compound separates, on the cooling of these solutions, as a yellow powder. Alkaline solutions, when dilute, produce, with the nitro-compound, red solutions, but, when concentrated, a flocculent brown compound deposit, and the solutions become also brown, in consequence of their decomposition.

Concentrated ammonia, at ordinary temperatures, forms a beautiful violet compound, part of which precipitates ; when dry, it has a bronze lustre. The ammonia compound is soluble in water with a violet colour ; acids do not precipitate the original yellow nitro-compound from this solution (as is the case when a very dilute solution of ammonia is taken), but a violet compound, which is soluble in an excess of acid with a red colour.

With a cold concentrated solution of carbonate of potash, the nitro-compound forms a reddish-brown crystalline powder, which dries with a metallic lustre ; it is not very soluble in cold water, but dissolves much more readily in hot water with a purple colour. A hot solution of carbonate of potash acts like a solution of caustic alkali, producing instantaneously, with decomposition, a flocculent brown body.

The solution of the nitro compound in ammonia changes its colour upon the addition of sulphuret of ammonium to purple, and then soon to a dark indigo blue. If an acid be now added to this blue solution, a dark purple precipitate is the result ; the precipitate settles readily, and when washed with cold water and dried, resembles indigo. Water dissolves this blue body very sparingly, with a purple colour ; the alkalies dissolve it, giving a splendid blue solution. The blue compound is also formed when the solution of the nitro-compound in alcohol, to which has been added a small quantity of hydrochloric acid, is brought in contact with metallic zinc.

The dry nitro-compound, if slowly heated on platinum foil, gives off yellow fumes, leaving a carbonaceous residue ; if quickly heated, it deflagrates, but the combustion in this case is also incomplete.

The behaviour of the nitro-compound produced by the action of nitric acid on aporetin, tends to prove that it is identical with chrysammic acid, which is so well characterized by its potash salt, by its transformation into chrysamminamid, and especially by the formation of that beautiful blue compound, hydro-chrysammid.

The formation of chrysammic acid from aporetin is of some interest, inasmuch as it has hitherto only been obtained from aloes ; it is therefore our intention to completely establish the identity of this acid, as prepared from aporetin, with that resulting from the action of nitric acid on aloes, by analyzing our substances as soon as we have a sufficient amount of material at command.—*Quarterly Journal of the Chemical Society.*

"GLYCERINA, GLYCERINE, SP. GR. 1.260," P.D.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—Permit me to request the favour of inserting in the *Pharmaceutical Journal* the important Test noticed at my sequel for pure glycerine, as an addendum to the list of Tests accompanying bottles containing glycerine having a "*sweet taste*" *!!!* Every specimen (called glycerine) not of sp. gr. 1.260 should be rejected! notwithstanding that the so-called glycerine has a "*sweet taste*" and not "*the fœtid mouse smell.*"

I remain, Sir, your most obedient Servant,

April 6th, 1858. GEORGE WHIPPLE, F.C.S.

LIQUOR POTASSÆ ARSENITIS OF THE LONDON PHARMACOPŒIA.

[THE following remarks, in reference to what has previously appeared on the same subject in this Journal, are inserted at the request of the author.]

The first point disputed is, that I had incorrectly given the statement of Dr. Garrod and Mr. Redwood. They said that the liquor potassæ arsenitis was a solution of arsenious acid in carbonate of potash. I think that that statement may be rightly understood to mean, that only a slight trace of arsenite of potash, if any, is formed, but I think I can prove that such is not the case. The next point was, that my figures were wrong; this was not the case either, for I had used anhydrous carbonate of potash instead of the ordinary carbonate of the shops.

By the first experiment I made, I proved that arsenious acid was capable of affecting a *complete* decomposition of carbonate of potash or soda, when boiled with them, if an excess of arsenious acid be used. In the experiment carbonate of soda and excess of arsenious acid were boiled together, when evident signs of escape of carbonic acid presented themselves. As the arsenious acid only dissolves slowly we could not expect to see violent effervescence, as if we had mixed a more soluble acid with the carbonate of soda, but that carbonic acid was evolved, I proved by passing the vapour rising from the liquid, through lime water, in which I obtained an abundant precipitate of carbonate of lime. The solution, when cold, was filtered, and evaporated to dryness, the residue yielding, as stated in my paper, in one case 99.79 parts, and in the other 99.61 parts in the 100, occupied by soda and arsenious acid, leaving no room for carbonic acid, and clearly showing that arsenious acid is capable of effecting a *complete* decomposition of carbonate of potash or soda, by boiling with them, if used in excess; and if we deduct from these figures the equivalents of arsenious acid and soda, required to form arsenite of soda, we find that the substance only contains about six per cent. of arsenious acid in excess. I now come to the next experiment in my paper, in which Mr. Redwood and the Editor said my figures were incorrect. In this case I used anhydrous carbonate of potash, and *therefore* the figures did not agree with those of Mr. Redwood's, who had calculated that I used the ordinary carbonate of potash, which he says contains $1\frac{1}{2}$ equivalents of water, but I think he will find that he will not buy two samples of that substance which shall contain the same quantity of water, it being so very deliquescent that only a few minutes' exposure to a moist atmosphere, or if kept in a bottle the stopper of which does not fit accurately, the quantity of water will be materially increased; under those circumstances, it would have been absurd for me to have used such a substance without previously drying it, as I could not have known for certain how much carbonic acid I had put in the solution in the form of carbonate of potash, and therefore, of course, could not tell how much had been expelled by the arsenious acid, by determining the quantity of carbonic acid left after the boiling. Mr. Redwood here likewise makes an objection to the use of grammes instead of grains; the disadvantage, *if any*, would be on my side, as it gave me a little weaker solution; but the difference in quantity is very slight—80 grains of each being ordered by the Pharmacopœia, and by using 5 grammes I used 77.22 grains; it does not therefore make 3 grains difference upon the quantity, and therefore *cannot* in any way interfere with the result. I boiled 5 grammes of each, viz., arsenious acid and carbonate of potash together, with ten ounces of water, and determined the quantity of carbonic acid left afterwards, and I found, as stated in my paper, that the arsenious acid had in this case also decomposed its equivalent of

carbonate of potash. Then Mr. Redwood says it was boiled too long; there is ground for objection there, I allow, to overcome which I have since made another experiment, in which the same quantity of the ingredients were used; but in this case, *immediately* the last portion of arsenious acid disappeared, I corked the flask and removed the source of heat; when cold I determined the quantity of carbonic acid present. There remained after boiling 4419 grains of liquid. If no decomposition had taken place the solution should have contained .556 per cent. of carbonic acid, but I only found, first, .262 per cent., and secondly, .265 per cent. What had become of the rest of the carbonic acid, if not expelled by the arsenious acid? In this case the arsenious acid has expelled three-fourths of the carbonic acid it could possibly expel, even if it had decomposed its equivalent of carbonate of potash. The directions of the Pharmacopœia being *strictly* followed in this experiment, with regard to the time of boiling, &c., no objections can be raised against it on that account. Mr. Redwood says all the arsenious acid is dissolved before the liquid reaches the boiling point; I must say I have *never* found it so, but so far from that, it will take sometimes ten or fifteen minutes to dissolve after the liquid boils. Mr. Redwood seems to think, "that if I had formed my estimate of the properties of arsenious acid by studying the effect of passing carbonic acid through a strong solution of arsenite of potash, I should not probably have been surprised to find it asserted that arsenious acid, under certain circumstances, failed to displace carbonic acid from its combinations." If Mr. Redwood will tax his memory a little, he will, I think, recollect that in the first paper I sent to them, but which they did not insert, I there even went further than he does, as I stated that the carbonic acid in the *atmosphere* was capable of decomposing arsenite of potash after some time. I placed some solution of arsenite of potash in a flask, and left it uncorked, and after a little while I found a considerable precipitate of arsenious acid, and the solution then effervesced strongly on the addition of an acid, which it did not before being put into the flask. So he will see I have studied both sides of the question, and I find that under *certain* circumstances carbonic acid is capable of decomposing arsenite of potash, and under *other* circumstances arsenious acid is capable of decomposing carbonate of potash. In making the liquor potassæ arsenitis of the Pharmacopœia, the latter circumstances are present, viz., boiling the liquid. Again, Mr. Redwood says "that arsenious acid is capable of performing the functions of a base, as well as that of an acid." I am well aware of that, but I do not know of more than one instance of that kind, viz., being made to take the place of teroxide of antimony in tartar emetic. There are other substances which, under different circumstances, will take the place either of an acid or a base. Alumina, for instance. Mr. Redwood takes it for granted that I thought, because arsenious acid was an acid, it must be a powerful one. I never said so, nor did I ever think so, but I do state that it is an acid powerful enough to decompose carbonate of potash, when boiled with it, either in dilute or concentrated solutions. Mr. Redwood also refers to the fact, that arsenites of the alkalies are alkaline to test paper, even the binarsenite, but I do not think that proves much. Bicarbonate of soda and biborate of soda, although, by composition, acid salts, act like an alkali upon test paper; on the other hand, alumina, which is, by composition a neutral salt, is acid to test paper.

9, *Walpole St., King's Rd., Chelsea.* HENRY K. BAMBER, Analytical Chemist.

DEATH OF FOURTEEN PERSONS ALLEGED TO HAVE BEEN CAUSED BY THE FUMES OF BURNING MINERALS.

ON the morning of the 28th of March, between two and three o'clock, a fire, attended with the loss of fifteen lives, occurred in a house situated in Gilbert Street, Bloomsbury Square, London. The inquiry into the circumstances of this melancholy event having elicited facts and statements relating to the cause of the death of some at least of those who perished, which involve scientific questions, and have called forth much comment, we have endeavoured to collect such particulars as will enable us to place the subject fully and fairly before our readers.

The street in which the fire occurred is a narrow lane, running immediately at the rear of the houses in Great Russell Street, which face the British Museum, The house in question, No. 20, Gilbert Street, consisted of a carpenter's shop on the

ground-floor, with side entrance, and two floors above, each divided into four small rooms, and tenanted by three families, comprising twenty individuals. The front of the house, No. 20, Gilbert Street, faced the south, while the back abutted upon the premises of Mr. Calvert, a mineralogist, in Great Russell Street, and was only separated from the latter in one place by a wooden partition, extending about six feet in width by nine feet in height. Against this partition, in a room on Mr. Calvert's premises, stood some cabinets, containing a number of minerals, arranged in the usual way in drawers. Of the three families in the house in Gilbert Street, one—namely, John Eastwood, his wife, and three children—occupied a front and back room on the first floor, and their bed, in which they were sleeping when the fire broke out, stood within three feet of the top of the cabinets of minerals referred to. The other two rooms on the first floor were untenanted. On the second floor, as on the first, there were four rooms, and these were let to two families, each family having a front room and a smaller back room, communicating with the front by a door. Between the back rooms was the well of the staircase, which was lighted from the top by a skylight; and the back rooms had borrowed light, by small windows, from the staircase. There were no external windows to any of the rooms in the back of the house. The only access to the back rooms was through the adjoining front rooms, the entrance to which was from the stairs; and the only ventilation to the back rooms was that afforded in each case by the fireplace, and by the door communicating with the front room. In the two rooms immediately over those occupied by the Eastwoods, lived William and Eliza Hedger and two children; and in the adjoining two rooms on the second floor, lived Richard Smith, his wife, and nine children. The rooms in which these latter lived were those furthest removed from the spot where the cabinets of minerals stood—the first floor and the staircase intervening.

The fire appears to have originated in the carpenter's shop soon after two o'clock. It was observed by a policeman at about a quarter of an hour or twenty minutes past two, at which time the flames were issuing from the windows of the carpenter's shop and from the door of the house. The Eastwoods had been aroused at this time, and were seeking means of escape. They found the flames rushing up the stairs, so that escape in that direction was impossible; and soon afterwards, a ladder having been provided, they got out through the front window, assisted by a neighbour. About the same time, or two or three minutes earlier, a son of Richard Smith threw himself from the second floor window, and received injuries, from which he soon afterwards died. Some person or persons were seen at the window of the front room occupied by the Hedgers, but this window was so constructed, that nobody could get out through it; and the inmates of that room, as well as the remainder of the Smiths, all perished in the burning house. At twenty-five minutes to three o'clock, Mr. Calvert, the mineralogist, was aroused by the police. He went into the room in which were the cabinets of minerals referred to, but the fire had not then reached the cabinets, although he saw the flames issuing from the roof of the burning house. The fire-escape arrived about this time, but no attempt was made with it to rescue any of the inmates of the upper rooms, as the flames and smoke were escaping from the windows of those rooms, as well as from the roof, and any such attempt was seen to be hopeless. The fire having penetrated through the wooden partition separating the burning house from the cabinets of minerals, the latter became ignited; but this did not occur before several of them had been removed. The backs of those which remained caught fire, and some amount of damage was done to them before the fire was extinguished. Some of the drawers were partially burnt, and many of the minerals were scorched, blackened with smoke, and destroyed as mineralogical specimens. Among the minerals thus injured were some ores of cobalt and nickel, which contained arsenic. There were also in the drawers a few crystals of nitre, not altogether amounting to more than two or three ounces at the outside. Mr. Calvert states that while the minerals were exposed to the fire, he perceived the fumes of arsenic in the room, which he ascribed to the action of the fire upon some of the cobalt or nickel ores, aided by the presence of nitre. At this time the fire had completely filled the house in Gilbert Street, and shortly afterwards the remaining part of the building fell in. None of the cabinets were consumed, although some of them were partially burned, and even the partition which separated them from the burning house was but partially destroyed.

Such is a brief history of the case, partly as given in evidence before the coroner, and partly founded upon an inspection of the premises in Gilbert Street and Great Russell Street, and upon a careful examination of the minerals and the cabinets in which they were contained.

At the inquest, it was thought by most simple-minded people that the deaths of the two families, the Smiths and Hedgers, who occupied the upper rooms of the house, were sufficiently accounted for by the peculiar construction of the house, the circumstances under which the fire occurred, and the absence of any available means of escape. The coroner, however, after an inquiry of three hours, said :— "It would be a satisfaction to him to have a *post-mortem* examination of several of the bodies ; and with a view to that, and obtaining additional evidence, he should propose an adjournment of the inquest." In reporting this result of the first meeting of the jury, the *Times* observed :—"We must confess that we do not see the object of a *post-mortem* examination, when the cause of death is in itself so evident, but *the motive of this experienced and able coroner for suggesting such a step is doubtless a wise and expedient one.*" Accordingly, the doctors and the chemists set to work on the bodies of the deceased, and the results of these examinations were brought before an adjourned meeting of the coroner and jury on the 13th of April. The doctors had examined the bodies of the fourteen poor creatures who perished in the burning house, and the chemists had analyzed the blood, lungs, stomach, and contents, &c., of five of those bodies. The following evidence was given by Mr. J. E. D. Rogers, late lecturer on Chemistry at the St. George's School of Medicine :—

"I was present during the *post-mortem* examination of portions of about eight of the bodies, and I took certain parts of five of them away with me for chemical analysis, namely, of William and John Hedger, Richard Smith, sen., Mrs. Smith, and Harvey Smith. I have made notes of my examination, and am now prepared to state the result. I believe that I have discovered the cause of death. I have analyzed the blood, lungs, stomach, and contents, also some of the air passages, of Mrs. Smith and John Hedger. The whole thing having assumed the character of an investigation, I will state *seriatim* the result of my experiments. The first thing I noticed was an absence of the usual appearances of death consequent on suffocation. There was a redness of the muscles and redness of the blood, whereby I apprehended that there must have been an inhalation into the system of some unnatural and unusual fluid. I therefore went and examined the premises to see if there could have been any matter of a poisonous character used in the carpenter's shop or elsewhere, but found no traces whatever of any. In a room, however, adjoining the immediate locality of the fire I learnt that some minerals had been destroyed. This room was in the occupation of Mr. Calvert, a mineralogist, who informed me that a very considerable portion of his minerals had been consumed. These minerals, when heated, he (Mr. Calvert) observed, threw off a large quantity of fumes of arsenic. There are several pounds' weight of arsenical ores, and an ounce and a half of arseniate of cobalt, besides tellurium, silenium, sulphur, and nitrate of potash. My opinion is, that the effect of fire on these substances would produce a direct tendency to deflagrate and cause combustion, which would from such poisonous matter immediately disseminate large quantities of poisonous fumes. On these grounds, therefore, I believe the cause of death to have been the inhalation of poisonous vapours ascending from these burning minerals, and which, by producing immediate prostration and utter inability on the part of the sufferers to move, allowed the effects of smoke from the burning timbers to accomplish their deaths more speedily and effectually. Secondly, the redness of the blood is a satisfactory index of death from some other cause than that of suffocation. If they had died from suffocation, the blood would have been of a dark colour, which is not the case in these instances, except in that of William Hedger. I knew of no exception to this appearance in cases of suffocation. Subjects when preserved by arsenic evince this remarkable evidence of colour. Solution of arsenic injected into the veins will redden all the tissues; I have, therefore, no hesitation in stating it as my belief that the chief instrument causing the death of four out of the five bodies or portions of bodies analyzed by me was the poison of arsenic.*

* Mr. Rogers afterwards corrected the report of his evidence, stating :—
"In the process of analysis I found no narcotic poison, but *distinct traces* of arsenic in four of

"A juryman inquired of Mr. Rogers if death would have been produced without the assistant agency of smoke, arising from the burning building.

"'Not so quickly,' he replied. 'The difference of action between common smoke and arsenious acid consists in the fact that when the latter is inhaled prostration immediately succeeds; but vapours from burning wood which contain carbonic acid, and in which no person could live, acting on a system prostrated by poisonous gas, would speedily cause death. Vapours from tellurium, selenium, and sulphur each contain arsenic.'

"The foreman, at the request of the jury, announced to Mr. Rogers the satisfaction they had experienced on hearing his testimony, and which, he observed, they were all enabled to understand.

"Mr. Bennett was then recalled, and stated his approval of Mr. Rogers's satisfactory explanation of the cause of death, in which, from a written statement he had previously made, he conscientiously concurred, adding—In the absence of other conclusions, I believe the cause of death of thirteen out of fourteen arose from prostration, resulting from the inhalation of poisonous and other gases; but I am unable to say what those noxious vapours were.* The effect of a volume of smoke would be the closure of the glottis, and the effect of inhaling arsenical vapours would be not to irritate, but to destroy nervous sensibility, and thus prevent the closure of the glottis, and allow free ingress to any other vapours.

"Gilbert Prout Girdwood, Fellow of the College of Surgeons, deposed—I was present at the *post-mortem* examination of several of the bodies. I went with Mr. Rogers to assist him in taking out the stomachs, &c., and was subsequently present and helped him at the analysis of the same. We both arrived at the same conclusion with respect to the probable cause of death by arsenious vapours. The vapour of arsenic induced coma, and prevented the sufferers from making an attempt to escape. Prostrated by a poisonous vapour, smoke from the burning wood hastened their death. In assigning a proportion to the agents of death, I am of opinion that the greater share was attributable to arsenic. Arsenic when inhaled always acts as a narcotic poison. The air passages had bright red spots, showing the effect of an irritant poison. The only exception was in the case of William Hedger."

It thus appeared that the *post-mortem* examination was not made for nothing, and that the expediency of the coroner's suggestion was fully justified. Nevertheless, many persons competent to form an opinion, have received the statements of the scientific witnesses with much less satisfaction than was expressed by the coroner and jury. The facts, as proved in evidence, are considered by many to be inconsistent with the conclusions drawn from the results of the scientific investigations. It is thought to be a most unlikely thing that the scorching and blackening of a few minerals, some of which contained arsenic, should, under the circumstances, have been the cause of the death of those who perished in the burning house. These minerals were not in the house itself, but in adjoining premises ; and the fire had not reached the minerals until the house, in which the deceased persons were, was filled with flame and smoke, which rushed up the stairs, and passed through the roof. When the cabinets containing the minerals caught fire, some arsenical fumes are said to have been observed in the room in which the cabinets stood. But even if we could suppose the deceased persons to have been then alive, the arsenical fumes must have passed from these premises into the burning house, and have travelled across the staircase, then serving as a chimney to the fire, to reach the rooms where it is assumed that they rendered the inmates unconscious victims to the after-effects of carbonic acid, smoke, and fire. If the cause of death was such as is represented by the scientific witnesses, the case is certainly one of the most remarkable on record.

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the bodies which I had examined. I had a large quantity of W. Hedger's blood, and in that blood there was *less arsenic* than in any of the others. I found unequivocal and sufficient evidence to satisfy my mind that there was arsenic."

BOOKS RECEIVED.

Transactions of the Royal Society of Arts and Sciences of Mauritius. New Series, part i., vol. 1. *Medicinal Plants growing or cultivated in the Island of Mauritius.* By Louis Bouton. Mauritius: Printed at the Cernéen Printing Establishment. 1857. 8vo, pp. 177.

Although bearing the title of a periodical, this pamphlet is in reality a little volume complete of itself, with preface and index, the whole devoted to an account of the medicinal plants of Mauritius. The author, M. Louis Bouton, tells us that the idea of producing such a work was suggested by Dr. Pappe's *Prodromus Floræ Medicæ Capensis.* We certainly hail with pleasure the appearance of M. Bouton's contribution to our knowledge of the useful plants of Mauritius, and wish that in other English colonies similar means were taken of extending our acquaintance with their natural productions.

In the little work before us, the plants are arranged according to their natural orders; after each species there is usually a note stating its native country, and, if introduced to the island, the date of its introduction, the localities where it occurs, &c., together with occasionally a brief botanical description. Then follow the French, English, and Indian names of the plant, and then some remarks upon its virtues, real or reputed, and its employment in the island: these remarks are generally, but not always, given both in French and English.

As we hope the task of examining and drawing attention to Mauritian Materia Medica may be continued, and that our author's work, like that of Dr. Pappe, may reach a second edition, we take the liberty of noticing a few points in which we think considerable improvement may be made. In the first place, the work is a strange mixture of French and English. The author's plan seems to have been to write in both languages, but the former so greatly predominates, and the English translation (if *translation* it can be called) is often so abridged, that a reader must be acquainted with French if he wishes to avail himself to the full of M. Bouton's information. We think the author had better have written wholly in French, with which language he is perhaps more thoroughly at home than with English.

The work admits of improvement in printing, the arrangement of the remarks, often in little paragraphs, being singularly confused and objectionable. We would also suggest the desirableness of briefly describing in a future edition the physical characters of some of the substances noticed.

With all its defects, however, we are glad of M. Bouton's little book. It has evidently been written without access to some useful works on Materia Medica, which would have afforded the author much assistance. We hope it will reach another edition, which we feel assured would be a great improvement upon the first.

On the Growth of Barley by Different Manures continuously on the same Land; and on the Position of the Crop in Rotation. By J. B. Lawes, F.R.S., F.C.S., and Dr. J. H. Gilbert, F.C.S. London: Printed by W. Clowes and Sons, Stamford Street, and Charing Cross. 1858.

Report Presented to and Read at a Special General Meeting of the Odontological Society of London, *held at the Society's Rooms, 32a, George Street, Hanover Square, March* 19, 1858, *and Resolutions passed at that Meeting.* London: Printed by Savill and Edwards, Chandos Street, Covent Garden.

Silver Sutures in Surgery. The Anniversary Discourse before the New York Academy of Medicine, *delivered on the* 18*th November*, 1857. By J. Marion Sims, M.D. (Published by order of the Academy.) New York: Samuel S. and William Wood, Broadway. 1858.

TO CORRESPONDENTS.

Sale of Poisons.—A Correspondent sends the following: "There is a person living in a town in Dorsetshire, who practises as a Surgeon and keeps a shop for the sale of drugs: he is addicted to drinking, and to avoid mistakes when he is inebriated or

unsteady, I am told that the poisons are all put on the top shelf, to reach which it is necessary to stand upon a *rickety stool*, and that by this ingenious contrivance the public are protected."

J. (Shrewsbury).—Bay salt is procured by evaporating sea-water by the heat of the sun, and is made chiefly on the shores of the Mediterranean; it usually contains small quantities of muriate of magnesia, sulphate of lime, and sulphate of magnesia.

A. W. P. S.—We know of no special work on the subject, but it would be included in any work on horticulture.

J. T. (York).—(1.) Gerhardt's *Lehrbuch der Organischen Chemie*, 4 vols., £1 19*s*. There is no English translation of the work.—(2.) It will be seen, on referring to the extract quoted from the Bye-laws, that it refers to Members, Associates, and Apprentices prior to a certain date.

Chemicus (Southampton).—Kamala may be obtained of Messrs. Allen, Hanbury, and Co., Plough Court, Lombard Street.

K. (Shrewsbury).—The compound sold as Driffield Oils, is so called from a place of that name in Yorkshire; we do not know by whom it was first made.

Early Closing.—"*A Retail Druggist*" informs us that, with the exception of one or two houses, all the Wholesale Drug Houses in London close early on Saturdays, and hopes that this announcement will induce his Retail brethren to assist them in carrying out their system, by sending orders early.

T. P. B. (Great Malvern).—If sufficient care be taken in pressing and drying the specimens, gummed paper will answer very well.

A Subscriber (Wolverhampton).—*Cod-liver oil and quinine.* Vol. xv., p. 239.

An Apprentice (Woodstock).—The Pharmaceutical Latin Grammar and Latin Pharmacopœia.

M. P. S. (Manchester).—Dr. De Jongh's statement that the pale cod-liver oil is bleached by some chemical process, and that only the light brown is genuine, is so absurd, as to be scarcely worthy of contradiction. The pure oil carefully prepared is pale. Excess of heat, the partial decomposition of the livers from which it is obtained, or the presence of extraneous matter, will give it a more or less dark colour.

"*Decency.*"—The practice of licking the backs of labels and biting corks should be prohibited at the dispensing counter.

Medicus.—Lard oil is produced in this country, and is a regular article of commerce. It is no doubt frequently used for adulterating other more costly oils. For the means of detecting such adulteration, see an article at page 356, vol. xiii. of this Journal.

Dunelm.—We are not acquainted with any complete analysis of oil of hop.

Registered Apprentices, Bath.—The word *alkali* is derived from *kali*, the plant from which soda was originally procured. Potash, lithia, and ammonia, substances possessing properties resembling those of soda, have long been included with the latter among the alkalies. Of these, ammonia is distinguished as the volatile alkali. Other substances, with properties somewhat similar to those of the foregoing, have been discovered in the vegetable kingdom, and are called vegetable alkalies. Others again, have been produced by artificial means, and these are called artificial alkalis. The list of alkalies, comprising the above, is now a long one.

To the Local Secretaries of the Pharmaceutical Society.

As it is probable that many of the back numbers of this Journal may be in the possession of the Local Secretaries (from not having been called for), it will be esteemed a favour if they are forwarded to the Secretary, 17, Bloomsbury Square.

Instructions from Members and Associates, respecting the transmission of the Journal, to the Secretary, 17, Bloomsbury Square, before the 20th of the month.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XVII.—No. XII.—JUNE 1st, 1858.

THE PROGRESS OF PHARMACY.

When a railroad is projected with a view of forming a communication between two or more populous districts, the announcement is usually received with a qualified approval. It may be a general opinion that the scheme, if practicable, would be advantageous; but a casual inspection of the obstacles to be overcome—the hills, valleys, and rivers to be cut, embanked, or crossed—dispels the bright prospects of the million, and reduces the number of supporters to a small fraction. As the work proceeds, the progress each day, week, or month is so slow as to be scarcely perceptible, and many persons look on in pity at what they conceive to be the folly of wasting labour and money in a hopeless enterprise. In the course of a few years a change comes over the dream of the lookers-on. The completion of the work, and the evidence of its success, having inspired fresh anticipations, some of the original supporters who had withdrawn from the undertaking during the period of its difficulties, resume their sagacity, and remark that they always thought it would answer sooner or later. Others, going with the stream, hasten to identify themselves with what now appears to be a safe speculation. Such have been the rise and progress of several of our great lines of railway, which are now established facts, necessary for the commerce of the country and the convenience of the public. The history of the Pharmaceutical Society presents some points of analogy.

When it was proposed to constitute Pharmacy, on the ground of qualification, as a branch of the profession, the general opinion might be condensed into these words: "It may be desirable, but you will never succeed." While the existing defects in this department of medicine were continually felt, and occasionally brought under public notice by some serious or fatal event, resulting from the incautious use of dangerous materials by ignorant persons, the notion of converting the trade of a Chemist and Druggist into a profession was not popular, and would probably never have been attempted if circumstances had not combined, at a favourable moment, to excite some *esprit de corps* among the previously disunited members of the Pharmaceutical body.

The establishment of a permanent Society having been determined on and undertaken, the protection of the general interests, the promotion of education, the cultivation of science, and the contingent advantage of a Benevolent Fund, furnished a variety of inducements commending themselves to the different tastes or dispositions of the parties concerned. For some years it was difficult to demonstrate to the satisfaction of the Members the direct relation between

their professional character and their commercial interests. The influence of education is gradual, and (as in the construction of a railroad) the progress is scarcely perceptible. The projected improvement is a theory in which the majority are not sanguine enough to have much faith. Those who have identified themselves with it, persevere, until by degrees the influence of the movement is felt, and its advantage more or less appreciated.

The Pharmaceutical Society is no longer a theory. It has surmounted what may be compared to the engineering difficulties of construction; the machinery is complete—all that was projected at the outset has been carried into practice, and only requires to be persevered in and allowed to proceed, in order to realize all that the most sanguine hopes could have imagined. The system of Pharmaceutical education has undergone an entire revolution; a considerable improvement has taken place in the general quality of medicines, greater attention is paid to the preparations of the Pharmacopœia, and a general desire prevails to introduce and adopt improvements in Pharmaceutical processes. On looking back at the old routine of an apprenticeship, and the mode in which the business was formerly conducted, the contrast is about as great as the contrast between travelling by the York Highflyer (a fast coach in its day) and a journey by railway at the rate of forty or fifty miles an hour. The traveller wonders how he could ever have reconciled himself to the tedious pace of the old slow coaches, and it is equally a matter of surprise that the comparatively neglected state of the Art and Science of Pharmacy in former times should have been tolerated by the Medical Profession and the public.

While occasional outbursts of enthusiasm among medical men and medical reformers have indicated a desire for some reform in Pharmacy, the work has been steadily in progress in the hands of the Pharmaceutists themselves, who are now recognized and invested with authority to regulate the qualifications of their future Members. This privilege it must be recollected entails with it a corresponding amount of responsibility. The directors of a railway are held responsible for the due performance of the duty which they have undertaken, and if they fail to perform that duty to the best of their ability for the safety and welfare of the public, they may expect to be displaced and superseded. In the same manner the profession and the public expect in those who have undertaken to regulate the Pharmaceutical Department, an efficient discharge of their responsible and important trust, on which condition alone they may expect to retain their position.

MEDICAL LEGISLATION, AND THE PRINCIPLES WHICH OUGHT TO REGULATE IT.

Mr. Thomas Duncombe has in some degree simplified the question of Medical Reform. Although the avowed object of his Bill, as stated in the title and preamble, differs from that of the usual Medical Bills, the tendency is in the same direction, so far as relates to the important feature of establishing a register of

all qualified practitioners. The customary aim of medical reformers is the restraint and punishment of unqualified persons, the protection of the public by the aid of the medical corporations against the mischief of quackery, and the protection of legitimate and recognized practitioners, by privileges having the nature of a monopoly.

Mr. Duncombe entitles his Bill "a Bill to define the Rights of Members of the Medical Profession, and to protect the public from the abuses of Medical Corporations."

He commences his preamble thus: "Whereas, it is expedient that every person should be at liberty to obtain Medical or Surgical aid wherever such person may wish, and that persons desiring such aid should be enabled to distinguish qualified from unqualified Practitioners. Be it therefore enacted," &c.

From this introduction it would appear that the author of the Bill is in favour of absolute "free trade" in Medicine and Surgery, with the simple condition that the patient shall not be imposed upon by persons practising under false pretensions. If this point were conceded literally and to the full extent, the propensity of the public for the marvellous would be even more than it is at present, a source of profit to the quack, whose success would be in proportion to his unblushing impudence in denouncing and ridiculing the orthodox and recognized conventionalities of the profession. Leaving this question, however, for the present, we find in the Bill a mode of effecting the registration of practitioners in Medicine and Surgery without the complication of establishing a Medical Council, and thus avoiding some of the intricate sources of jealousy and dispute in which Medical Bills usually flounder and ultimately perish. The Bill before us provides that every practitioner possessing any of the qualifications enumerated in a schedule (A) to the Act, shall be entitled to registration on application in the proper quarter. The existing bodies having the privilege of granting diplomas or licences to practise, are enumerated in the 5th section, each of which is required to furnish to the registrar-general of births, &c., a correct list of all its members and licentiates, the registrar-general being empowered to employ the district registrars to assist in the registration. A provision is added for enabling foreign practitioners to acquire the privilege of registration. Each person is to be registered according to the qualification which he possesses, and upon obtaining a superior qualification, he may claim to have the same notified in the register on the payment of a small fee. The registrars of deaths are to give special notice to the registrar-general of the death of medical practitioners, that their names may be omitted in the register which is to be published annually; and each corporation or licensing body is required to furnish, within two months, the names of all candidates admitted. The 17th section is a peculiar one:— "Every person registered under this Act shall have the right to practise medicine or surgery in any part of her Majesty's dominions, and all bye-laws of any college or colleges, university or universities, or corporations, interfering with or limiting this right, are hereby declared null and void, and are hereby repealed."

We cannot pretend to calculate what might be the effect of this random shot among the bye-laws, but its apparent tendency is the removal of all distinctions of rank or degree in the profession, a result by no means conducive to the public benefit. It should be the object of the Legislature to promote and encourage the highest qualification which is attainable; and for this purpose it is necessary that those persons who take the trouble to acquire a high qualification should be distinguished from those who are content to take the minimum rank entitling them to registration.

The Bill further provides for the establishment of any new Medical body, by the authority of her Majesty in Council, when the number of such body amounts to 500, "provided it can be proved that the foregoing examining bodies do not provide means to enable the public to realize the certainty that the examination by these bodies tests sufficiently the knowledge required for the safety of the public, &c."

None but registered practitioners are to hold public appointments or to be entitled to recover fees or compensation for attendance, &c. The penalty for fraudulently assuming any name or title is not to exceed £20 nor less then £5. A registrar guilty of falsification is to be liable to fine and imprisonment. The Bill is not to prejudice or affect the lawful occupation or business of a Chemist and Druggist.

This Bill, although not effecting all that is desired by the Medical Profession generally, or by the several sections or bodies which it comprises, would, we think, with a little amendment, realize some additional advantage to the profession and security to the public. It might also prepare the way for a further advance at a future time. The rock upon which Medical Bills usually split is the attempt to do what legislation cannot suddenly effect, the result of which endeavour is the clashing of conflicting interests, and the formation of explosive compounds by the projected union of incompatible elements. A Bill aiming at nothing but the registration of the members of each existing medical or surgical body, each individual being empowered to practise under the title in which he is registered, and a penalty being inflicted for the assumption of any unauthorized title, would be a step in advance. Certain powers of restricting irregular practice already exist, and although these powers are not so effectual as the several medical bodies desire, yet to a certain extent they operate as a check upon quacks. If superadded to this partial protection, a complete register were established, with the means of summarily convicting and punishing all persons practising under false pretences or colours, the problem of Medical Reform would be in a fair way for solution.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

MEETINGS OF COUNCIL.

May 5th, 1858.

Present—Messrs. Bell, Bird, Brew, Bucklee, Davenport, Deane, George Edwards, Hanbury, Meggeson, Morson, Peacock, Sandford, Smith, Squire, and Standring. The following were elected

MEMBERS.

ABERAVON .....Evans, Evan
BEDFORD .....Stewardson, Henry
KINGSTON (Canada West) .....Skinner, Henry
LONDON.....Crocker, Edwin
" .....Yarde, Giles
" .....Stathers, John
MAIDSTONE .....Argles, John
WINCHESTER .....Bailey, Richard

May 19th.

Present—Messrs. Ballard, Bell, Bird, Bucklee, Davenport, J. B. Edwards, Hanbury, Macfarlan, Meggeson, Morson, Peacock, Sandford, Squire, Standring, and Waugh. The following were elected

MEMBERS.

BRIGHTON.....Breton, Walter
DUNOON (Argyleshire) .....Stirling, George

CONVERSAZIONE.

ON Tuesday evening, the 18th of May, the President and Council received a numerous company of medical and scientific men, together with Members and Associates of the Society, at a Conversazione. The reception-rooms of the Society's house were thronged throughout the evening, and by the kind assistance of numerous contributors, a large number of objects of interest were provided for the occasion. These included microscopes, stereoscopes, aquariums, photographs, minerals, rare metals, chemical preparations, specimens illustrating the recent applications of chemistry to the arts, experiments illustrating modern discoveries, &c. &c.

Microscopes were contributed by Messrs. Smith and Beck, Ross, Ladd, and Salmon, in addition to those belonging to the Society, and to the professors attached to the Institution.

Stereoscopes were contributed by Mr. G. Knight, Messrs. Murray and Heath, Smith and Beck, and Salmon. Mr. Knight exhibited a very interesting series of views in Palestine and the Holy Land; and Messrs. Murray and Heath some beautiful views in Spain, including the Alhambra and surrounding country.

Photographs were also contributed by Mr. Knight, Messrs. Murray and Heath, and Mr. Hughes.

Mr. Claudet exhibited, in a darkened room, a new optical instrument of his invention, called the stereomonoscope, by which a single picture may be seen in relief. In this apparatus an image is projected upon a sheet of ground glass in the centre of a large black screen, and when viewed in a straight line by both eyes, appears in full relief; if viewed obliquely, however, or with only one eye, the effect of relief is destroyed. In this way several persons may view the picture at once, no fixed distance being necessary; a convex lens may also be used to magnify the effect.

The principle of Mr. Claudet's apparatus is based upon the fact to which he first directed attention—namely, that the image on the ground glass of the camera produces the illusion of relief. This phenomenon, however, does not take place if the image is received on any other medium, such as paper. The rays refracted by the various points of the lens, and falling upon the ground glass, are only visible when in a line coinciding with the optic axis. Consequently the rays emerging from the ground glass, and entering the right eye,

are only those which have been refracted obliquely in the same direction by the left side of the object glass, those entering the left eye having been refracted by the right side of the object glass. Therefore the one image is really the result of two images, each of which is visible to one eye, and invisible to the other.

Such is the principle of Mr. Claudet's discovery, which he has illustrated by several interesting experiments. His stereomonoscope consists essentially of a camera fitted with two object glasses, before which is placed an ordinary stereoscopic slide, the image being received upon the ground glass, which is surrounded by a dark screen.

Mr. Ladd performed some interesting electrical experiments—also in a darkened room—with a powerful Ruhmkoff's coil, and showed the recent experiments of Mr. Gassiot, which formed the subject of the Bakerian lecture, delivered by him this year — namely, the stratifications and dark bands which occur in electrical discharges taking place in the torricellian vacuum.

The Council were indebted to Dr. Matthiessen for some fine specimens of the metals of the alkaline earths, lithium, calcium, strontium, and magnesium in plate and wire; and also a series of wires of the different metals, including antimony and bismuth, and a specimen of antimony crystallized in cubes.

To Mr. Morson for a fine specimen of the metal magnesium; a set of aluminium weights, and a specimen of pulu.

To Dr. W. Squire for specimens of caprylamine, nitro-salicylates, dinitrosalicylates, &c., some very fine crystals of iodide of cadmium, and a large specimen of phloridzin.

To Dr. Gladstone for some calcareous tubes, which have been found in a sand-hill near Mogador, in Barbary, by G. F. Habershon, Esq.

To Mr. Tennant for a case of rare mineralogical specimens, including a large crystal of Iceland spar.

To Mr. Huskisson for some exceedingly perfect crystals of iodide of potassium.

A large tower of alum and some fine masses of crystals were displayed upon the table, and also some very fine crystals of bismuth, the property of Mr. Bell.

The Council were also indebted to Mr. Calvert, of Manchester, for some specimens of fabrics dyed with murexide; also with the chlorophyll of common grass, and with different products obtained from coal tar.

To Dr. Edwards, for some specimens of "Water Glass" or mineral gum (silicate of soda).

To Mr. Hanbury, for some cups carved out of Realgar or native sulphide of arsenic, and used by the Chinese physicians, and also for a specimen of a new edible fruit from the north of China, obtained from a species of *zizyphus*.

To Messrs. Carpenter and Westley, for some curious specimens of Chinese carving in Brazilian pebble or crystal.

To Mr. H. M. Plumbe for a Russian pill machine taken from a medicine cart the day after the battle of the Alma.

To Mr. Sowerby, for two cases of skeleton flowers, a very fine specimen of lace bark, and a collection of fruits, including specimens of the bread fruit (*Artocarpus incisa*), the fruit of the Adansonia digitata, and of the vegetable ivory plant (*Phytelephas macrocarpa*).

To Mr. Bentley, for a collection of fruits, including the mangosteen (*Garcinia mangostana*), the litchi, the longan, the monkey pot, the Brazilian nut, Chilian pine, &c. &c., and also for some specimens of abnormal growths of stems.

To Messrs. Wicks and Ghislin, for some specimens of South African fibres obtained from the Juncus serratus and other plants.

To Dr. Warren de la Rue, for four large photographs of the moon, eight inches in diameter, taken with a Newtonian telescope of ten feet focal length, and thirteen inches aperture.

To Professor Abel, for some photographs representing the solar eclipse of March 15, 1858, as seen from the Royal Arsenal, Woolwich.

To Messrs. G. Knight and Co. for a case of Voightlander's orthoscopic lenses. These lenses are especially intended for taking views, copying works of

art, &c. They consist, like portrait lenses, of two achromatics, but instead of both being collecting lenses, the back, or smaller one, is a dispersing lens. The advantage gained by this new combination being a larger field, increased amount of light, better perspective, and a greater degree of sharpness of the various objects placed at different distances.

To Mr. E. G. Wood, for his polyorama stereoscope. This apparatus consists of a stereoscope attached to a case containing a number of views, which, by turning a handle on the outside, are successively brought into view.

To Messrs. Perreaux and Co., for a pump arranged with a very simple form of valve made of India-rubber, and approaching somewhat in form and action to the valves of the human heart.

To Mr. Cunningham, for one of Davis and Kidder's magneto-electric machines for medical purposes. The electricity in this apparatus is obtained by rotating the coil before a permanent magnet, thus avoiding the use of a battery.

To Messrs. Elliot Brothers, for a new polariscope, an electrometer, &c.

To Mr. A. Allchin, and to Messrs. Claudet and Houghton, for leech aquariums; and also to Mr. A. Lloyd, for a sea-water aquarium, containing some very fine developments.

To Mr. C. F. Buckle, for a new leech conservatory.

To Mr. Whipple, for two specimens of English otto of roses.

To Mr. Condy, for samples of his patented disinfecting fluid, consisting of the permanganate of potash and soda.

To Mr. Hooper, and also to Mr. Knotts, for new forms of feeding-bottles for infants.

To Mr. Britten, for a patent label damper.

To Mr. Harvey, for a patented portfolio containing views of Central America.

To Mr. Dixon, for some views stained on glass, by a new process.

To Mr. J. Macgregor, for a series of diagrams of curious modes of marine propulsion, and among which were, inflated skins, as pictured on the Nineveh marbles; swimming with the help of ice (A.D. 1472); Tartar raft tied to a horse's tail, as a man swims by his side; Chinese skin boat, propelled by the hand, paddling in the water; different modes of rowing adopted by the Egyptians; Jonathan Hull's steam-boat, and Papin's steam-engine; modern Chinese drawing of an English steam gun-boat, &c. &c.

There were several arrangements for the electric light exhibited during the evening, including Du Bosque's, for which the Council were indebted to Dr. de la Rue; a modification of this, for which they were indebted to Mr. Pepper, of the Royal Polytechnic Institution; and another modification of the same apparatus, which was contributed by Mr. Kerr through the instrumentality of Messrs. Murray and Heath. In addition to these, Dr. W. S. Squire exhibited his electric light apparatus, which he has now brought to a great state of perfection.

In the refreshment-rooms, Mr. Richard Knight afforded a practical demonstration of the excellence of his patent soda-water apparatus.

SEVENTEENTH ANNIVERSARY OF THE PHARMACEUTICAL SOCIETY.

Wednesday, May 19th.

MR. JACOB BELL, PRESIDENT, IN THE CHAIR.

The PRESIDENT expressed a hope that the Report which the Council had to present to the Meeting would be considered satisfactory by the Members at large. In accordance with an expressed desire on a former occasion, the Report had been printed for circulation amongst the Members before the Meeting, and it would therefore be necessary to add a few remarks to bring the information up to the period of the Meeting. On this occasion there would be no contested election for the Members of the Council, because only the exact number had been proposed for election, and, according to the bye-laws it was then too late to add any names to the list. It would have been the case on former occasions had not the Council added several names to the list, considering it was better as a general rule that the Council should

be actually and bonâ fide elected by the Members whose privilege it was to do so by the constitution of the Society, rather than that the Council should be a self-elected body. But if the Members neglected their duty of nominating candidates under the powers of the Charter and the Act, the Council had no alternative but to fill up the list themselves, and consequently become, to a certain extent, a self-elected Council. Though the Members had been reminded of their duty in the Transactions of the Society, only three names had been proposed on the present occasion, and the Council had filled up the exact number. He hoped in future, if the Members wished to infuse new blood into the Council, they would recollect it rested with them to do so. The advantage of competition on these occasions was also desirable, as an additional inducement for the attendance of Members. The Annual Meeting of the Society was an important event, as it afforded the Members an opportunity of making inquiries and suggestions in reference to the management of the Society, or anything affecting the interests or prospects of Pharmaceutical Chemists, and therefore it was desirable it should be numerously attended. He hoped, however, the Council might infer from the absence of a contest, or any source of excitement on that day, that the general feeling amongst the Members was, that their interests were well watched over, and that the Council had used every exertion to promote the prosperity of the Society.

The Secretary (Mr. Bremridge) read the following

REPORT OF THE COUNCIL.

FINANCIAL STATEMENT—*From January 1st to December 31st*, 1857.

RECEIPTS.	£	s.	d.
Balance in Treasurer's Hands	504	16	0
Balance in Secretary's Hands	107	2	1
Life Members' Fund:			
14 Life Members' Fees ... 123 18 0			
Interest ... 37 17 5			
	161	15	5
Benevolent Fund:			
Subscriptions ... 51 3 0			
Interest ... 137 2 6			
	188	5	6
Government Securities, Interest	195	15	11
Fees:			
32 Pharmaceutical Chemists ... 184 16 0			
37 Assistants ... 161 14 0			
80 Apprentices ... 168 0 0			
	514	10	0
Subscriptions:			
400 London Members' ... 419 9 6			
1726 Country Members ... 1807 1 0			
235 Associates ... 123 7 6			
143 Apprentices ... 75 1 6			
	2424	19	6
Arrears of Subscriptions	57	15	6
Lecture Fees	34	13	0
Sale of Journals	1	13	0
Sundries (repaid)	1	17	6
Balance of Petty Cash due to Secretary	8	0	10½
	£4201	4	3½

EXPENDITURE.	£	s.	d.
Benevolent Fund:			
Investment ... 208 7 3			
Gratuities ... 30 0 0			
	238	7	3
Invested in Government Securities	928	15	0
Conversazione ... 54 11 3			
Pharmaceutical Meetings 15 1 6½			
J. T. Cooper, Accountant 5 8 0			
Repayments ... 13 11 0			
	88	11	9½
House Expenses	22	2	2
Rent, Rates, and Taxes	364	6	1
Repairs	30	2	9
Fixtures and Fittings	15	10	6
Apparatus	0	12	0
Museum	31	15	11
Postage (including £18 8s. 6d., Questions on Sale of Poisons Bill)	66	5	9
Stationery	11	0	5
Advertisements	8	4	6
Printing and Engraving	56	10	4
Collector's Commission	40	17	9
Board of Examiners	67	4	0
Expenses of Society in Scotland	52	16	8
Travelling, Country Members	76	9	10
Salaries	300	0	0
Wages	211	2	0
Pension, late Secretary	75	0	0
Gratuities	15	0	0
Journals	561	13	2
Do. Delivery and Postage	184	12	6
Library	13	8	0
Carriage	1	3	2
Professor of Chemistry and Pharmacy, including duties as Curator in his department, and payment of Assistant	300	0	0
Professor of Materia Medica and Botany, including duties as Curator in his department, and payment of Assistant	250	0	0
Subscription to Royal Botanical Gardens	21	0	0
Prize Medals	3	7	0
Repayment to Secretary, due 31st Dec., 1856 ... 2 9 10			
Plus ... 0 2 8			
	2	12	6
Balance in Treasurer's hands	162	13	3
	£4201	4	3½

We, the undersigned Auditors, have examined the Accounts of the Pharmaceutical Society, and find them correct agreeably with the foregoing statement, and that as shown by the Books of the Society there was standing in the names of the Trustees of the Society, at the Bank of England, on the 31st of December, 1857:

	£	s.	d.
On Account of the General Fund, New 3 per Cents.	7345	4	8
Benevolent Fund, 3 per Cent. Consols	5036	16	6
Life Members' Fund, 3 per Cent. Consols	1325	18	7

GEORGE L. PEDLER,
WILLIAM BOWER,
JOHN CARR,
ARTHUR BOWDLER HILL,
ADOLPHUS FREDERICK HASELDEN, } Auditors.

February 10*th*, 1858.

It will be remembered, that in the Report of last year, the Council drew attention to the importance of obtaining for the Society premises better adapted to its requirements, and suggested that a fund should be raised for purchasing a permanent freehold, the lease of the Society's house having then only a limited term to run.

Since that time an opportunity has occurred of carrying out the views then expressed, without the necessity of raising the proposed fund.

The lease of the two adjoining houses (Nos. 72 and 73, Great Russell Street, which originally formed a part of the mansion now occupied by the Society) was in the market for sale, and the Council effected the purchase for the Society; they immediately entered into negotiations for an extension of the lease from the ground landlord, and this, too, has been completed on favourable conditions; the Society has consequently now a lease of the three houses for a term of ninety years, determinable, at the will of the Society only, at the end of the first thirty or sixty years. The adjoining houses are at present occupied, thus affording a reduction of the rent, but the entire premises are capable of adaptation to the purposes of the Society, should it be deemed prudent and desirable to occupy them. The Council, however, before disturbing the existing arrangements and embarking in an undertaking which would involve considerable expense, feel it to be their duty to report to the Members the result of the negotiation, in order that the position and prospects of the Society may be fully discussed and considered previously to any enlargement of the establishment.

There is yet another financial department which claims attention—the Benevolent Fund. Whilst providing for the future prosperity of the Society, it must not be forgotten that adversity may overtake individual Members; and the Council can but observe that the subscription of £51 3*s*. is a small amount from more than 2000 Members; it may be said (and is a cheering fact) that the demands on the fund have been small, but it must be remembered, that in the youth of a Society this is always the case; as time wears on, further applications may be expected, and should be provided for.

The attention of the Council having been directed to the Sale of Poisons Bill introduced last year into the House of Lords, the subject was referred to a Committee, whose report, after reception by the Council, was laid before a meeting of the Members in London in the month of February. Meetings were also held in Edinburgh, Liverpool, and other places, at which the subject was fully discussed, and it appeared to be the almost unanimous opinion of the Society that the Bill as originally introduced into the House of Lords was altogether impracticable—that in its amended form it contained some very objectionable provisions—that while it contemplated an arbitrary and inconvenient interference with the business arrangements of the Pharmaceutical Chemist, it contained no adequate provision of safety to the public by restricting the sale and dispensing of strong or poisonous drugs to qualified persons; indeed, in some of the proposed precautionary measures, it was calculated to give

rise to additional liability to accident or facility for crime, by substituting an imperfect and imaginary safeguard for that which is practically found to exist in the responsibility and discretion of the qualified Chemist. Application having been made to Lord Granville for an opportunity of explaining the views of the Society on the subject, an appointment was made for that purpose. The interview, however, was prevented by the change of Ministry, and the report of the Committee was consequently submitted to Mr. Walpole at the Home Office on the 20th of April. From what then transpired, and also from remarks on the subject in Parliament, there is reason to believe that the Society will have an opportunity of considering and expressing an opinion upon any measure which may be brought forward relating to the sale of poisons.

The School of Pharmacy has afforded satisfactory evidence of the progress of education in this branch of the profession. The Report last year was favourable as compared with previous years. During the present session the number of students exceeds that which was stated in the last Report, and their general progress and assiduity is highly satisfactory. Nearly fifty students have entered as pupils in the practical class in the laboratory since the commencement of the session, and the attendance at the lectures continues steadily to increase.

The general advancement of Pharmaceutical education has enabled the Board of Examiners to introduce a corresponding improvement in the mode of conducting the examination. The qualifications of candidates are tested by practical manipulations as well as in the branches of theoretical and scientific knowledge which constitute the foundation of a sound Pharmaceutical education. The number of candidates for examination continues to increase, and during the past twelve months 37 have passed the major, 53 the minor, and 72 the classical examination. The existing arrangements and frequent communication between the two branches of the Society in North and South Britain have a tendency to ensure uniformity of qualification, and also to promote a continuance of the harmony which has for some time past prevailed in the Society.

The Council have much satisfaction in observing that the Society is becoming every year more generally appreciated and recognized. Its certificate is required by the Army Medical Board as a condition of appointment to the office of Dispenser in the Army, except in the cases of qualified Apothecaries; the Society is considered and consulted in cases of legislation on subjects relating to Pharmacy, and the title of Pharmaceutical Chemist is acquiring increased value by the estimation in which it is held by the profession and the public, as denoting qualification, thus proving advantageous in a substantial as well as a professional point of view, by promoting success in business.

As a natural consequence of the influence thus enjoyed by the Society, the desire to join it is increasing, and a general improvement is observable in the qualifications of the candidates who present themselves for examination. This being the only condition on which admission can now be obtained, young men, on commencing their apprenticeship, look forward to the examination, and prepare themselves accordingly. There is also reason to believe that the increased respectability and professional character which the business of a Pharmaceutical Chemist is acquiring, afford an inducement to a superior class to select Pharmacy as their future occupation—a result no less conducive to the interest of the public than to the position in society of the rising generation of Pharmaceutists.

The Council cannot conclude this Report without venturing to exhort the Members of the Society to second individually the united efforts of the body corporate, by renewed and increased exertions to elevate their position as Members of an educated and liberal profession, to bear always in mind the vast responsibility resting on them, and to endeavour, as far as in them lies, to give opportunities of instruction to pupils committed to their charge.

The CHAIRMAN said, that since the completion of the Report the Council had

received some information with reference to the Sale of Poisons Bill. At the interview with Mr. Secretary Walpole, the views of the Council and the Society in reference to that Bill were laid before him, together with the draft of a Bill which the Council considered an improvement on that introduced into the House of Lords, and which the Council believed would not be objected to by the Society at large. The Secretary of State communicated with Lord Derby, who had consulted the College of Physicians on the subject, and he (the Chairman) had that morning ascertained that an answer had been sent by the College of Physicians to Lord Derby's communication, approving of, with certain exceptions, the Council's alteration in the Sale of Poisons Bill. He had not been able to obtain a copy of that document to lay before the meeting, it being a private communication between the College of Physicians and Lord Derby. Further information might hereafter be obtained, but all he could now do was to state in general terms what he had been informed was the opinion of the College of Physicians on the subject. The College objected to striking out oxalic acid and arsenical pigments from the schedule of the Bill. They saw no objection to the enumeration of a certain number of poisons to be sold only by qualified or licensed persons, but which at the same time should not be subjected to the inconvenient restrictions to which the schedule referred, and they were further of opinion that there might be a separate examination from that of the Pharmaceutical Society. The separate examination was a point upon which they would be at issue with the College of Physicians, and of course it would be necessary they should have some conference on the subject. The Board of Examiners proposed was to consist of three persons, one from the College of Physicians, one from the Society of Apothecaries, and one from the Pharmaceutical Society. All Apothecaries and Pharmaceutical Chemists to be exempted from this examination, and to be permitted to sell poisons without a licence. On the subject of the proposed Board of Examiners, he thought the Pharmaceutical Chemists must make a stand, because, if the permission to deal in those articles were to be given by a Board constituted by Government on a lenient examination for a small fee, it would naturally draw a number of persons to that examination who did not correctly understand the distinction between such a qualification and that of a Pharmaceutical Chemist, and prevent them coming for examination to the Society, the object of which was to raise the qualification of Pharmaceutical Chemist as much as possible. A certificate, considered by many probably as good, if not better than their own, would, in many instances, no doubt, divert the applicants from that channel of education they were creating, and therefore it was to the interest both of Pharmaceutical Chemists and the public that the Council should well watch the proceedings in contemplation for the adoption of this new Board, and obtain for the Pharmaceutical Society the privilege of examining those parties who might require a licence for the sale of poisons. If that point were conceded, he saw no reason why the other views entertained, so far as they had been communicated to him, might not be concurred in by the Members of the Society. It should be borne in mind that this was rather an important era in the progress of the Society. They were about to be more completely recognized by Parliament than they had ever yet been, and it would depend a great deal on the zeal and unanimity with which they continued to persevere in their present exertions to elevate the profession by attaining a higher standard of education and qualification for protecting the public against accidents, whether they maintained and improved that position which they now already enjoyed. There would be one or two other subjects introduced to their notice, but at present he should confine their attention to the reception, &c., of the Report.

Mr. Farmer moved that the Report now presented to the meeting be received and printed in the Transactions of the Society. He considered the Report so satisfactory, that it needed no recommendation.

Mr. Coles seconded the motion.

Mr. Boyce called attention to the sum of £40, charged this year for collecting Members' subscriptions, as against £29 11*s.* last year. The present charge was something like 2*s.* a head, which he thought high for collecting.

Mr. Waugh said it was easy of explanation. A certain per-centage was paid for collecting the subscriptions, and if the collector had collected and paid over the requisite sum for that amount, he was justly entitled to it.

The Secretary explained that it was made up of 5 per cent. for the collection

of Members' fees, the Benevolent Fund, fees from Assistants and Apprentices, a sum of £2 2*s.* to the collector for sundry attendances during Mr. Smith's illnesses, and for commission paid to the Manchester and Liverpool collectors.

In reply to a question from a Member, the CHAIRMAN said the collector received his commission when a Member brought his subscription to the Society, provided he had previously called for it.

Mr. COLLINS asked if it was the distinct proposition of the Council that they should have the entire power of examining all persons who applied for licences for selling poisons.

The PRESIDENT said the Council certainly considered that if they were competent to examine persons as to their qualification for dispensing medicine, they were equally competent to examine persons for a simple licence to deal in poisons ; and the appointing of a Board of Examiners as proposed, independent of the Pharmaceutical Society, would, he thought, be equivalent to shutting up the Society as an Examining Body altogether.

Mr. COLLINS considered they should endeavour to maintain the recognition of the Pharmaceutical Society by all possible means, and he suggested that they should recommend to the Secretary of State that, in the formation of a Board of Examiners, he should take the Board of the Pharmaceutical Society, adding a member or more from each of the other corporations. Such a modification would probably be beneficial rather than otherwise.

The CHAIRMAN said that a compromise of this description had frequently been under the consideration of the Council, and had been recommended by them. There would be no objection to a Member of the College of Physicians being a Member of this Board. He thought it would also be more satisfactory to the Government, the Society having the sanction and co-operation of the College of Physicians in conducting the examinations.

Mr. HUMPAGE considered the co-operation of the College of Physicians desirable, but he thought two distinct certificates very undesirable. If two certificates were legally recognized, one requiring a much lower qualification than the other, they would find that the majority would be of the lower qualification, which would be an injury to the public and the Pharmaceutical Chemist ; because the object of the latter was to raise, and not lower the status of the profession.

Mr. MASON called attention to an item in the accounts of £75 charged as pension to Mr. Smith, the late Secretary, and asked if it was only a moiety of the sum to be given to that gentleman, or if it represented the full amount.

The CHAIRMAN said, Mr. Smith had been receiving a pension of £150 a year from the Society, and that was one of the subjects that would come before the Meeting in a regular form. The Council were of opinion, considering the great services Mr. Smith had rendered the Society both in its establishment and afterwards, and in the discharge of which onerous and anxious duties his health was undermined, that it was only an act of justice to which he was entitled, to give him a pension for his past valuable services. According to the Charter, the Council had power over the funds of the Society, and they could give Mr. Smith such a sum from year to year as they thought fit, but they were of opinion it was better the matter should now be decided by the Annual Meeting rather than leave it to the Council, because probably some few years hence the Council would be re-constituted by Members who would have no personal knowledge of Mr. Smith's claims on their gratitude and bounty. In confirming the annuity by the votes of the Annual Meeting, it would be an authority to subsequent Councils.

Mr. MASON also called attention to the sums for the Professors of Chemistry and Materia Medica, and asked in what relation the Professors stood to the Society. The Professor of Chemistry received fees from assistants with which to pay the expenses of the laboratory.

The CHAIRMAN said, the two items referred to comprised the necessary expenses for keeping up the School of Pharmacy, including the salaries of the two professors. It was formerly separated into small items, and contained the salaries of the persons who kept the apparatus, &c., in order, but it was thought better to give the professors a certain sum to include everything, and he considered the sums charged very moderate.

Mr. MASON did not take exception to the sums, or consider them too much. He merely asked the question for information.

The CHAIRMAN then put the motion for the adoption of the Report, which was carried unanimously.

The CHAIRMAN said that at a Council Meeting held on the 5th August last, the following resolution was agreed to:—

Moved by Mr. DEANE, seconded by Mr. WOOLLEY:

Resolved—"That in consideration of the valuable services rendered to the Society for a long period by Mr. George Walter Smith, the late Secretary, he be paid for the present year, by quarterly instalments, one hundred and fifty pounds, and that the Members at the next Annual Meeting be recommended to make the grant for the period of Mr. Smith's life."

The Council since then had taken the solicitor's opinion on the best mode of drawing up a resolution that should secure the payment of an annual sum to Mr. Smith, without making it an annuity that might be alienated, anticipated, or disposed of, but be for Mr. Smith's personal benefit. It was necessary, in matters of this kind, to guard against contingencies, and the following form of resolution had been prepared accordingly :—

"That the recommendation of the Council to grant to the late Secretary, Mr. G. W. Smith, the sum of £150 per annum, as an annuity during his life, be approved.

"Subject to the Council making the payments in such manner as it may, from time to time, direct.

"And subject also to the Council having the power and authority to discontinue the annuity in the event of any alienation or assignment of the annuity being made, or any charge being made, or attempted to be made, upon the same."

Mr. BIRD (Vice-President) said he had had an opportunity of witnessing the energetic and assiduous manner in which Mr. Smith devoted his services for the benefit of the Society, and he strongly advised the meeting to agree unanimously to the resolution which he had much pleasure in moving. Mr. PEACOCK seconded the motion.

Mr. COLLINS considered it a very large sum for the services Mr. Smith had rendered. It was considerably larger than that paid to retired half-pay naval officers, many of whom had large families to bring up in a respectable manner. He considered the finances were not in a sufficiently flourishing condition to maintain so large an annual charge.

Mr. WAUGH said that if Mr. Collins had belonged to the Society as long as he (Mr. Waugh) had, he would not have considered it too large a sum.

Mr. COLLINS: I was one of the founders of the Society.

Mr. WAUGH said, in that case, Mr. Collins must be well aware of the great services rendered by Mr. Smith in establishing the Society, and afterwards in ensuring its success. When he (Mr. Waugh) had given up in despair the establishment of the Society, Mr. Smith persevered, and hoped almost against hope. They, however, had been successful; but had it not been for the perseverance of Mr. Smith and the President then in the chair, they would never have succeeded, and though they had a long list of names as founders, those two gentlemen were the chief corner-stones of the Society. He thought he had shown sufficient to induce the Meeting to give the sum asked freely and cheerfully. If they did, they would stand well with the public for the liberal manner in which they dealt with servants who had made great sacrifices for the benefit of the Society.

Mr. BALLARD concurred in the opinion expressed in reference to Mr. Smith's claims on the funds of the Society.

Mr. MACFARLAN reminded the Society what effect such assiduous attention on the part of Mr. Smith had had on his health. It had completely prostrated all his energies, and had been the means of incapacitating him from active employment, and he (Mr. Macfarlan) considered it was their duty, as it should be their pleasure, to assist Mr. Smith in the hour of his adversity.

Mr. MASON said he was an economist in every sense of the word, but, at the same time, he thought the Society ought to mark, in a substantial manner, the estimation of Mr. Smith's services. From the indefatigable and efficient manner in which he conducted the affairs of the Society, he had gained the good feeling and opinion of all its Members, and he thought the Society ought unanimously to accede to the motion now before the Meeting.

Mr. HUMPAGE said that when he saw the sum of £75 entered on the account for Mr. Smith, he hoped, for the credit of the Society, it was not the extent of the annuity

they proposed to give, and he was much pleased to find it was to be double that sum. He had known Mr. Smith from the first, and it was not enough to say that he did the duties of his office well. He did more than that. His life and soul was in its progress, and to that was to be attributed his present unfortunate position, for he was unable, like most men, to throw off the cares and anxieties of business when he left it. It was to Mr. Smith's services, in a great measure, that the Society had been so successful, and he (Mr. Humpage) considered it was their duty to mark their sense of Mr. Smith's exertions by granting the annuity proposed.

Mr. Bird said he proposed the resolution from his knowledge of the services rendered to the Society by Mr. Smith, which had had such an effect on his health, that though he was better than he had been, he would never more be fit for active services. He also moved it from the high opinion he entertained of him, but as it was considered desirable the resolution should be moved by a Member out of the Council, he withdrew it.

Mr. Herring said he had lately been suffering from ill-health. He had, however, unexpectedly, come to town that morning, and he was glad he had, for nothing could have given him greater pleasure than to propose the resolution Mr. Bird had withdrawn. He had had the honour of being a Member of the Council for a great many years, and he could bear testimony to the zeal and energy displayed by Mr. Smith in furthering the progress of the Society. In fact, whether at his own house or in the Society's buildings, or at his (Mr. Herring's) house at Hampstead—in fact, out or home—there was nothing to be got out of Mr. Smith but how they could advance the interests of the Society. For some time before Mr. Smith gave up, he noticed the work was too much for him, and that he was breaking down under it. He (Mr. Herring) considered the Society ought to think it a pleasure and a duty to award to Mr. Smith this small annuity.

Mr. Lescher, as a Member of the first Council, in seconding the resolution, bore testimony to the extraordinary zeal and energy displayed by Mr. Smith on all occasions. He had been struck down by over-exertion in the cause, and the Society ought to look after his welfare now that his health had failed.

Mr. Peacock considered the case of the retired naval officers bore no parallel to that of Mr. Smith's. The former were generally in possession of all their faculties, and were at liberty to undertake duties by which to increase their income. Mr. Smith was very differently situated from that, because he was so afflicted that he was incapable of work. He thought the Society ought not to exhibit to the world a false economy, and he called upon them to unanimously agree to the proposition before the Meeting.

Mr. Farmer also bore testimony to Mr. Smith's general exertions, and remarked, that if it had not been for his efforts, they probably never would have been formed into a society. He referred to the early meetings held at his house, where Mr. Smith attended and drew up the resolutions, and he also expressed a wish that the resolution had gone a little further, and been extended to Mrs. Smith, in the event of Mr. Smith's death, because Mr. Smith was prohibited from becoming a Member and partaking of the Benevolent Fund, or participating in the benefits of a Society he had been instrumental in founding and bringing to its present state of efficiency and high standing. He had much pleasure in supporting the resolution, and hoped that his suggestion with reference to Mrs. Smith would be borne in mind, and acted upon if necessary on some future occasion.

Mr. Collins said he had no intention, when he called attention to the subject, to move any amendment to the resolution, but only to throw out a hint that they ought not to be too liberal with their limited income. He was a member of a very large corporation with ample means, where no provision was made for retiring officers. He hoped this instance would not be made a precedent on future occasions, but be looked upon as an exceptional case.

Mr. Squire hoped, for the credit of the Society, the annuity would be granted unconditionally. He thought it would be mean and contemptible to append conditions to such a vote.

Mr. Herring would be as equally disposed to the widow, should Mrs. Smith survive her husband, as he was to Mr. Smith; but he thought it advisable to let that be, and if the question arose at a future time, then to take the matter into consideration.

The Chairman said he was happy to find so much unanimity of feeling on this

occasion. It was a case not likely to occur again, as it was not likely they would have any person with claims on them precisely similar to those of Mr. Smith. He considered it was the duty of every institution, of every house of business, and of every private establishment, to recollect and reward the services of faithful servants, and he hoped this Society would not be wanting in the performance of that duty.

The resolution was then put, and carried unanimously.

Mr. HERRING, in reference to the candidates about to be elected, observed, that he thought it was impossible they could have a more efficient list. They were not like a ministry, in one day and out another. The Society was gaining ground very rapidly, and he hoped and trusted the unanimity that had been that day displayed would yield fresh benefits. During his illness he had been attended by two or three of the most eminent men in London, and they had recommended him a prescription which none of them could make up, viz., turtle and champagne. He assured them they were both excellent things in their way, and he thought the Society would do well to issue a similar prescription annually in the shape of a dinner. It would materially increase the Benevolent Fund, for he assured them, from experience, there was nothing like a good dinner of turtle and champagne to open the hearts of individuals on charitable occasions.

It being considered advisable to comply with the form according to the Bye-laws of appointing Scrutineers, Messrs. Humpage, Goodbarne, Mason, and Mumford were appointed, and declared the following Members to be duly elected

ON THE COUNCIL.

Messrs. Bell, Bird, Bottle, Brew, Bucklee J. B. Edwards, Hanbury, Hollier, Macfarlan, Peacock. Sandford, Squire, Standring, and Waugh.

AS AUDITORS,

Messrs. Barnes, Bower, Carr, Haselden, and Hill.

The CHAIRMAN then declared the Council and Auditors for the ensuing year to consist of—

COUNCIL.

BALLARD, EDWIN, Farringdon, Berks
BELL, JACOB, 338, Oxford Street
BIRD, WILLIAM LIONEL, 42, Castle Street, Oxford Street
BOTTLE, ALEXANDER, 37, Town Wall, Dover
BREW, THOMAS A., 71, East Street, Brighton
BUCKLEE, WILLIAM HENRY, 86, New Bond Street
DAVENPORT, JOHN THISTLEWOOD, 33, Great Russell St., Bloomsbury
DEANE, HENRY, Clapham
EDWARDS, GEORGE, Dartford
EDWARDS, JOHN BAKER, 42, Berry Street, Liverpool
HANBURY, DANIEL BELL, Plough Court, Lombard Street
HOLLIER, ELLIOTT, Market Place, Dudley
MACFARLAN, JOHN F., 17, North Bridge, Edinburgh
MEGGESON, GEORGE, 64, Cannon Street, City
MOORE, JAMES LODGE, 1, Craven Street, Westbourne Terrace
MORSON, THOMAS N. R., 19, Southampton Row
PEACOCK, HAMERTON R., 170, High Street, Poplar
SANDFORD, GEORGE WEBB, 47, Piccadilly
SQUIRE, PETER, 277, Oxford Street
STANDRING, THOMAS, 1, Piccadilly, Manchester
WAUGH, GEORGE, 177, Regent Street

AUDITORS.

BARNES, JAMES B., 1, Trevor Terrace, Knightsbridge.
BOWER, WILLIAM, 96, Tottenham Court Road
CARR, JOHN, 173, High Holborn
HASELDEN, ADOLPHUS FREDERICK, 18, Conduit Street
HILL, ARTHUR BOWDLER, 11, Little Britain

The CHAIRMAN, before adjourning the meeting, thought it desirable to make a few remarks on the subject of the recent acquisition of a long lease of the premises occupied by the Society. It had previously been in contemplation to purchase a site of ground and erect a building, the cost of which would probably have been not less

than £10,000 or £12,000. The Council considered the opportunity of obtaining the house now occupied by the Society, and the two adjoining houses, for a long term of years, at a fair annual rent, was favourable to the interest of the Society; and as it was not imperative immediately to occupy the whole, this question would be regulated according to the convenience and the circumstances of the Society. He would be glad to hear any remarks or suggestions from the Members on the subject.

A general approval having been expressed by the meeting,

Mr. CHATER moved, and Mr. WATTS seconded:

"That the cordial thanks of this Meeting be presented to the Council for their very valuable services during the past year, and that the ensuing Council be requested to continue their exertions during the current year."

Carried unanimously.

After a vote of thanks to the President, and a similar vote to the Vice-President and Treasurer, the Meeting separated.

PHARMACEUTICAL MEETING, EDINBURGH.

THE last Scientific Meeting of the present Session took place in the Hall, 51, George Street, Edinburgh, on the evening of 6th May, 1858,

MR. FLOCKHART, PRESIDENT, IN THE CHAIR.

A note of apology from Dr. Maclagan, President of the Royal College of Physicians, having been read, explaining his unavoidable absence, a paper was read

ON GERMAN YEAST AND ITS PREPARATION.

BY MR. JOHN MACKAY.

THERE are doubtless some present, who, with myself, have been again and again puzzled to tell the history and composition of the material, the preparation and use of which I intend to bring shortly before the Society this evening. Well known by name here and elsewhere, the manner and mode of its production have until lately been unknown. It is, however, quite possible many may be surprised that German yeast should be an article of so much importance, as to require this special notice; and therefore, in reply to such an objection, as well as making us all acquainted with the great demand which has of late years existed for this substance, and also as an introduction to the subject, I may be allowed to give the following particulars regarding the quantity consumed in England within the last few years, and the extended particulars of which will be found in the report of a paper by the Right Hon. Lord Blantyre, communicated by Professor Simpson to the Royal Society of Arts during the spring of last year.

It would appear that, prior to 1843, there was a duty levied upon German yeast imported into Great Britain; but early in that year the duty was removed, and it was allowed to be brought into this country *free*. For eleven years after this it was so mixed up with other articles in the Government returns, that it was not easy to arrive at the exact quantities imported until 1854, when it was found that from Holland alone there were imported into England during the year, 55,312 cwts., and from other places 79 cwts., making a total of German yeast received by us in one year from the Continent, of 55,391 cwts. The average price of this article being about £2 15*s.* per cwt., gives a total value of £152,324 sterling. Large, however, as this quantity may appear, its importation has since then been considerably increased; for in the year ending 30th September, 1855, there were brought into London, Grimsby, Hull, and Newcastle, 59,045 cwts., and still more recently—viz., in the year ending 30th September, 1856—there were brought into the same ports 66,607 cwts., or about 3330 tons, showing an increase between 1854 and 1856 of 1216 cwt. Calculating this increased quantity at the same rate per cwt., we find that during 1856, the money-value of German yeast imported into England was £183,168 15*s.* sterling. There is no place where this article is so extensively used as Yorkshire, and from the same authority we learn that into Hull alone there were imported in one year, 44,656 cwts., or, as nearly as possible, two-thirds of the whole.

From such a statement of facts, it does at first sight appear singular and strange, that more attention has not been devoted by chemists and others to the fabrication of this article. Of course it can easily be understood that every means will have been taken by our continental neighbours to prevent the secret of its preparation becoming

known, as it will be obvious, that the great demand for German yeast in England must be of considerable importance to the manufacturer in Germany and elsewhere. Even to the present day there are strange surmises as to the source and production of German yeast, and curious, indeed, are some of the notions regarding it. Some allege it is nothing more than a plant, which grows freely in Germany, but the cultivation of which is kept secret; while others, disliking its strange appearance, declare it to be some vile compound, of a most unhealthy nature, and capable of engendering, more or less, every disease to which human flesh is heir. According, however, to the statements now made in many chemical works, it is believed that this mysterious substance is nothing else than purified yeast. Of course the limits of this short paper quite preclude me from entering upon the chemical changes produced by the use of this substance, and therefore I propose, in what follows, to try and induce further investigation, with a view that, if practicable, some of the money which now goes to the Continent, may rather find its way into the pockets of our own countrymen. That the subject may be more fully understood, I will proceed to describe—1st. The ordinary mode of baking bread; 2nd. Unfermented bread; and, 3rd. German yeast and its preparation. By such a course, it may be probably shown by comparison, whether any great advantage is to be gained by the one process or the other; and also the reason why German yeast, so much employed in England, should be quite unknown, or, at all events, so little used in Scotland. I make this statement, because I tried among our Edinburgh bakers to get a sample of German yeast, but signally failed; and the specimen I intend shortly to submit, was got in London, through the kindness of a friend there.

1. *Simple Baking.*—The term Bread is familiar to us all—truly a household word—and is mentioned in the world's history at a very early date. Thus, in Holy Writ, we are told that man, after the expulsion, was condemned to earn his bread by the sweat of his brow. I do not stop to inquire in what sense the word is here used; whether as denoting any particular form of food, or generally to indicate that, for the sin of disobedience, man was to be compelled to work for his sustenance; but this we have every reason to believe—long ere baking was introduced, lentils and other seeds were crushed to powder, mixed with water, and allowed to dry, either spontaneously, by the heat of the sun, or on stones heated artificially; and this very simple process we still continue to follow to a certain extent to the present day. Oatmeal cakes, peas and barley meal bannocks, and ordinary water biscuits, may be cited as instances of primitive baking. Bread made in this manner has, however, many objections; for it is not only difficult to masticate, but in many cases not easily digested. Increased and continued heat appears to have been the first improvement in baking, inducing more solubility in the starch of the flour; and the next important step was a process, by which, from the action of some substance, a cellular or sponge-like consistence was given to bread; and this was found in a very simple manner in leaven, which is nothing more than flour and water, subjected for a certain time to an increased temperature, thus inducing a state of fermentation, more flour and water being then added, to which the leaven imparts a similar action, producing a peculiar effect, similar (but with some disadvantages) to the ordinary panary fermentation. This leaven of ancient times is now comparatively obsolete, and for this reason—that the acetous fermentation is apt to set in, and thus render the bread unpleasantly sour and disagreeable to the palate. Indeed, to prevent such an effect, the greatest care is required; and therefore this very old mode of baking has been superseded (in this country at least) by the free use of yeast by bakers, who now almost universally employ this substance as a ferment for their flour. For a considerable period the yeast of the distiller was the kind of barm or ferment used in baking. At times this article has not been easy to get, and at present cannot in this country be procured at all. So lately as the beginning of the present century, men were employed by bakers in Edinburgh to wander on horseback and foot, to pick up from distilleries in town and country as much yeast as they could get. Indeed, so great was the difficulty, that it is within the recollection of a retired baker still alive, that when a boy, his master sent one of his men now and again across the Frith of Forth in a small boat, pitcher in hand, to the opposite coast of Fife, to collect what yeast he could get. Now it must be recollected this journey, sixty years ago, was of a very different kind compared to crossing in a steamer of the present day; and such a travel between the Lothians and the

kingdom of Fife speaks loudly of the supply of this material falling very far short of the demand. As a natural consequence, therefore, some plan had to be devised, for the purpose of obtaining a steady supply of what was now felt to be an absolute necessity for the production of the staff of life, and hence the formation of barm companies. From inquiries I have made, I understand the first company for supplying bakers' yeast commenced in Edinburgh about 1806, and since then many more have sprung into existence. Imperatively demanded by the wants of the bakers themselves, many became partners, and continue so to the present day ; and thus they not only ensure themselves a constant supply, but get it at a moderate price. This bakers' yeast is obtained by making an infusion of malt, and inducing fermentation, by the addition of a small quantity of brewers' yeast. This latter article of itself would be useless to the baker, both from its strength and bitterness. The barm produced, however, as just described by the companies, answers remarkably well, and is employed as follows :—Half an imperial gallon is well mixed in and kneaded with a suitable quantity of salt and water, to a sack of flour, containing 18 stone. This mixture, when allowed to stand the usual number of hours (generally twelve), is divided into loaves, and heated or fired in the oven. While such a mode of baking answers every purpose, and is the one generally followed, yet there are many who prefer making their own ferment daily. Where this is done, the yeast is called *Patent Parisian Barm*, and when followed, has the recommendation of being easy, simple, economical, and convenient. The derivation of the name is a mystery, as no one appears to know that such a compound is used by the French people. The true and best mode of preparing it is to infuse 1½ lbs. of ordinary malt in two imperial gallons of boiling water for four hours, keeping up the temperature during that time to 160° F. Half an ounce of hops are then boiled in other two gallons of water for fifteen minutes, and while at the boiling temperature, the decoction is to be added to 15 lbs. of flour. The malt infusion is now mixed in, and the whole stirred up and set aside in a warm place in the bakehouse, covered with a cloth, and a heat of about 80° maintained during eight successive hours, by which time fermentation has so far proceeded, as to give a yeast in every way well suited for baking bread of first quality. Such a quantity as that now described will be found sufficient to mix with a sack of flour of the usual size, and with salt and water will produce from eighty-six to eighty-eight full-sized loaves, weighing 4 lbs. each.

It may be here stated that yeast obtained from any source for the purpose of making bread, is used for the purpose of converting the sugar in the flour into carbonic acid and alcohol. In fact, the same action, though of course to a much smaller extent, takes place in the panary as in the vinous fermentation, the action of the ferment eliminating carbonic acid by its action upon the saccharine matter of the wheat, while the mechanical working or kneading mixes the fermenting principle so thoroughly, that by the time it is ready for the oven, the particles of flour are so completely under its influence, that mechanical distention takes place, and the loaf is rendered soft and spongy. It was a considerable time before the true nature of yeast was understood, but the fungoid nature of barm is now so well known, and is treated of at such length in many chemical works, from its first stage in sporules on to the last stage of the plant in its aerial fructification, that it needs not I should enter upon its history. An interesting paper on the chemistry of bread appeared in last month's Journal by Mr. Odling. Amongst other matters he states that Mr. Graham was the first to demonstrate, in 1826, that the panary and vinous fermentations were alike, and further, that the quantity of proof spirit produced in baking bread was rather less than one per cent. of flour used. Yet the whole quantity of alcohol must be enormous when the quantity of bread consumed in London alone is considered, as it is calculated that no less than 300,000 gallons of spirit are given off from the bread, all of which, of course, escapes into the air. It is further stated, that at the military bakehouse in Chelsea, some years ago, about £20,000 sterling were expended in the attempt to collect and condense the alcohol produced, but which, of course, proved fruitless.

Having now hastily glanced at the usual mode of baking bread, I may only further state that some bakers assist their ferment by adding from 8 lb. to 12 lb. of potatoes to each sack of flour, and some think the addition improves the bread very much. I now proceed to consider the means which have more or less occupied the public mind for several years, viz., the different processes from time to time introduced to bake without barm, or, in other words, to produce *unfermented bread*. From

what has been already said, it will be seen that, although a great chemical decomposition takes place in the saccharine matter of the flour, yet the results from the action are entirely mechanical, or in other words, the bread is raised in the attempts of myriads of minute particles of gas trying to escape. This, therefore, gave rise to the idea that means might be adopted by which, while the mechanical effect was produced to the exclusion of any chemical change in the flour itself, the sugar might be retained in the bread, and while the loaf remained as light or nearly so, it would prove sweeter to the palate, and more nutritious as an article of diet. Now there have been various means resorted to in the attempt to carry out this idea. Dr. Whiting's process, patented in 1837, by which carbonic acid is set free by mixing carbonate of soda with one portion of flour, and hydrochloric acid with another, the carbonic acid gas being thus given out, and chloride of sodium or common salt formed. Tartaric acid and carbonate of soda are much used by bakers; others use sesquicarbonate of ammonia alone or in combination with some of the other compounds. Jones and Sewel's processes are somewhat the same, the latter being simply a modification of Dr. Whiting's form. Churned milk and carbonate of soda are also employed. Baking powders, which are generally composed of alkaline bi-carbonates, tartaric acid, sugar, and in some cases magnesia, is another mode. Butter and lard are also employed in fancy baking for the same purpose, and act by being converted into vapour, which, in its endeavour to escape from the dough, has the effect of raising it, producing a light, spongy, or puffy material.

Nearly all the above methods have fallen into disuse, excepting the baking powder and the use of carbonate of soda and tartaric acid. I was lately surprised to find a printed bill issued by one of the makers of carbonate of soda on the Tyne, giving several forms for the preparation of different kinds of bread without the use of yeast. In all the receipes given, muriatic acid was the substance recommended to liberate the carbonic acid gas. In some districts in England baking powder is in very extensive use, and I know one maker who is frequently buying a ton of acid and soda for the purpose of making this preparation. But perhaps the most recent idea of this kind is the patented process of Dr. Dauglish, for the purpose of baking by forcing into flour the carbonic acid previously mixed with water. Observing some time ago mention made in one of the London papers, that Messrs. Carr, of Carlisle, had tried, or were about to test this new method of baking, I lately put myself in communication with them, and find that they are now really using successfully aerated water under the above patent for the purpose of baking biscuits. The following is the process followed:—"Flour and water are mixed together in a closed kneading machine into a paste; when that paste is formed the water is made to give off the carbonic acid in a similar manner to the flour by the process of fermentation. The mode in which the water is made to act in this way, after it has been mixed with flour, is as follows:—It is first supersaturated in a closed vessel, by being pumped in, as in making soda-water. When the water has been thus prepared, the flour, &c., are put into the kneading vessel, which vessel has been placed under the same pressure as has been used for the water, after which the water is allowed to run in and is mixed with the flour into paste or dough. The kneading being finished, a cock is turned, and the pressure escapes from the kneading vessel; the dough immediately rises, and when set at liberty, occupies five or six times the space that it did before—the lightness of the dough being in proportion to the pressure used." Messrs. Carr manufacture six different kinds of biscuits in this manner, and being curious to see them, I got a supply direct, and now submit samples. As nothing is said regarding this patent in forming bread, I presume it has not yet been found equally successful with it as with biscuits.

I may close the remarks upon unfermented bread by stating that, by a calculation made, the saving in flour is something considerable where a ferment is not used. As has already been shown, ordinary bread is baked at the expense of the sugar which passes off as carbonic acid and spirit, while by the mechanical mode, the sugar is retained, and the saving calculated to be roughly, as follows:—A sack of flour weighing 280 lbs. makes, by the old process, 360 lbs. of bread, or ninety quartern loaves, while, by the new process, the same flour will produce 408 lbs., or 102 quartern loaves. I have, however, no means of deciding the correctness of this statement.

I now come to consider the preparation of German yeast. There are, I

understand, several published forms for producing it, but I will only refer to two. Sheridan Muspratt gives the following as Johnston's mode of preparing it:—Crushed rye is masked with a certain quantity of barley meal, and the wort cooled to a proper temperature. Half a pound of carbonate of soda and 6 ozs. of sulphuric acid, diluted with water, are added to every hundred pounds of crushed grain employed, mixed with the wort, and fermentation induced by the addition of yeast. From this strongly fermenting liquid the yeast is skimmed off and strained through a sieve with cold water, which is allowed to settle. It is afterwards washed with cold water, and finally pressed in cloth bags till it becomes the consistence of dough. It is made thus in large quantities in Rotterdam, and imported chiefly to Hull. The other process is one given by Lord Blantyre, and which, he states, he derived from a most trustworthy German source. As this is the form I have pretty closely followed in the following experiment, I need not give it ; I may only remark that his Lordship stipulates for distillers' yeast to be used, which is an article impossible to obtain in this country, for reasons to be hereafter given. I had therefore to employ brewers' yeast at considerable disadvantage, in consequence of the large quantity of hop contained in this substance, and which therefore required excessive and repeated washing to free the deposit from its very objectionable bitterness.

The following is the manner in which I prepared the sample of German yeast about to be submitted :—

I procured 10lbs. weight of good brewers' yeast, and I added to this in a large tub, five imperial gallons of water. The weather being rather warm, I kept the water in this instance, and throughout the whole of the experiment, at a temperature of from 40° to 48° F., by introducing portions of ice from time to time. Having switched this well for some minutes with an ordinary cream brush, I allowed it to stand for eight hours. I then poured off as much water as I found clear, and added a fresh supply of cold water, again switching well together. This was allowed to remain for fourteen hours longer, and I then poured off the clear liquid, adding four and a half gallons of cold water. The mixture was again well agitated, and allowed to settle for nine hours, the clear liquid again poured off and fresh water added, and a further maceration allowed for fifteen hours. The clear liquid again poured off, and fresh water added, until, by these repeated washings and macerations the water lost its bitter taste almost entirely. I then treated the deposit or sediment with thirty grains of carbonate of ammonia and fifty grains of bicarbonate of soda. These I beat well in, and allowed the whole to stand fifteen hours. I then added four gallons of water and ice, and allowed it to remain forty-eight hours, by which time the yeast was thoroughly deposited, and having carefully removed the clear liquid, I collected the soft moist yeast, which I placed in a linen bag, and, by gentle pressure, having got rid of a portion of the water remaining in the yeast, I now present the result. I have only further to remark that the process, extending over several days and nights, was very carefully conducted and watched, the water being withdrawn partly with a syphon and partly by pouring it gently off. The water was kept, as nearly as possible, at a uniform temperature throughout.

The product of the operation was very nearly 2 lbs. weight, thus showing a loss from the yeast originally employed of 8 lbs.

It will be observed that the operation now described consists simply of washing ordinary yeast with fresh cold water, with the view of getting rid of all the impurities, as well as the bitter taste of the hops, which all yeast, but especially brewers', must of necessity possess—and then adding alkaline salts to sweeten, or free from acid, the purified portion of yeast remaining, and which salts are, in their turn, washed away by another addition of cold water.

I confess that during the progress of the experiment I was sanguine as to the practical results, and which I am now about to relate. In order really to test whether the yeast prepared by me was suitable for baking purposes, I gave a small portion to a well-known baker in town, Mr. Mackvitie, Charlotte Place, with a request that he would fairly try it with flour, water, and salt, and give me a statement of its effects. The first portion he tried he declared to be very weak as a ferment, but as he thought he might not have given it justice on a first trial—being a new material—he determined on trying it a second time; and as I had meanwhile received from London a specimen of fresh German yeast, imported from Holland direct, I requested Mr. M. to use a certain quantity of it for the purpose of comparing with the result of my own experiment. The following is a statement of the

effects produced upon the flour:—The German yeast from the Continent being much drier than that prepared by me, it was proposed to use double the quantity of the latter to the same quantity of flour, &c. This was done, but the former rose much earlier, in about half the time, and to a much greater extent than the latter. You have now a portion of the bread baked by both kinds of yeast. There is also some fancy bread made by the German yeast, for which purpose it answers uncommonly well. In order to prosecute the experiment still further, I dried very nearly $5\frac{1}{2}$ ozs. of the yeast I had made, and found this quantity produced only about 6 drachms. I submit a sample of this dried yeast, and in order to test its vitality had a small portion mixed with flour and water, with a view to induce fermentation, but found that all life had ceased—no fermentation taking place, although subjected to continued warmth, and mixed, as stated, with flour and water. This will scarcely cause surprise, because had any plan of drying the German yeast been found to answer, no portion of the large quantities annually imported would ever have been sent across to England in other than the dried form.

From what I have now stated, you will doubtless agree in thinking that the experiment just related has only been partially successful. It may be proper to state that the mere cost of materials employed to produce the 2 lb. was 3*s.* 1*d.* The yeast having cost 1*s.* 4*d.*, and the quantity of ice required to cool the water 1*s.* 9*d.* Of course the expense of the latter substance, under certain circumstances, might be done away with, and thus lessen very much the cost of production. Though there was a want of complete success in this experiment, yet it was fully more than might have been expected from the following note which accompanied the sample of German yeast so kindly sent me by a scientific friend in London:—

"I have obtained a sample of German yeast, together with the following particulars:—It is imported from Holland, where it is made. Several attempts have been made to produce it in this country, but without success, although men have been brought over who were accustomed to make it abroad. It cannot be kept many days without deterioration, especially in hot weather. The man from whom I got the sample receives it fresh every day. It is imported in little canvas bags, containing 6 lbs. each. The retail price is 1*s.* per lb., or 10*d.* by the bag. It is used for all purposes for which common yeast is used, and is considered to be more uniform in its effects than common yeast, while it is free from any bitterness, or at least from the bitterness of the hop."

This statement is striking, as indicating very considerable difficulty in manufacturing the yeast in this country. From previous computation, the price paid for German yeast was £2 15*s.* per cwt., or about 6*d.* per lb., while it appears in small quantity to be 10*d.* and 1*s.* It is obvious, that if the real source of German yeast be the distillery, our continental friends can not only beat us in point of material, but also in price. From the great distilleries in Holland I understand there are no difficulties in the way of obtaining yeast, while in this country, not only do the distillers use all their own yeast, but absolutely contract for large supplies of brewers' barm from London and elsewhere. It further appears, that no yeast is ever removed for use from the tuns in which the distiller ferments his grain, because he imagines its removal would interfere with the object he has in view, namely, the conversion of the saccharine matter of the grain into spirit entirely, or as it may be otherwise stated, he thinks the complete alteration of the wort would not be obtained, and therefore to make certainty doubly sure, he stirs the yeast into the fermenting liquid, and allows the action to proceed until he obtains perfect attenuation, which of course destroys his ferment, and he has therefore to depend upon the brewer for a fresh supply of barm. Again, the Excise restrictions in this country are so excessive, that even had the distiller yeast to spare, he would be wary and cautious in disposing of it, unless with the consent and concurrence of the Excise.*

Before closing these remarks, we might glance at the probable consequences in event of German yeast forming a separate branch of manufacture in this country.

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* It has more than once occurred to me while writing this paper, that I may have erred in using brewers' yeast for the experiment, and that a better preparation might have been obtained had I substituted the yeast as prepared by the barm companies for the use of the baker. Doubtless the one ferment would have been in a much riper condition than the other, and it is quite possible I may yet experiment further on this substance, with the view of approaching more closely the real German yeast.

A most important consideration is cost of production. The baker at present here and elsewhere, is supplied with a certain preparation, for which he pays 5*d.* per half gallon, and this produces ninety loaves of bread. Now it requires ℥j. of the German yeast to yield five loaves, and therefore 1 lb. would only produce eighty. Supposing this to cost 8*d.*, the difference would be considerably against the new substance. The next important consideration is, does the German yeast produce a better loaf? Now many of our bakers have reached the acme of perfection in baking, and those who make their own barm do so at a trifling cost, but were they to begin with German yeast, there are several disadvantages. It is very liable to spoil. Again, it is very whimsical, for, unless the bags are very carefully treated, loss of vitality is apt to take place, as even the fall of one to the ground has been found fatal to it as a ferment. It is therefore, I think, obvious, that unless some very simple method be discovered of manufacturing this new article from some other than the present source, the advantages on the side of the old system are by far too numerous to tempt bakers to give it up, although, undoubtedly, for those families who bake their own bread the German yeast must, when procured statedly fresh, be always a favourite, because it not only bakes a sweet and wholesome loaf, but, what is of great importance, it does so in about a third of the time required by the old fermenting method of bread-making, and which in any household must, if practised, prove tedious, troublesome, and inconvenient.

Some discussion followed the reading of the paper, in which Mr. Macfarlan, Mr. Robertson, and Mr. Brown took part.

Dr. Fergusson then explained and showed in action Winter's Electrical Machine. He expounded with much clearness and minuteness the construction of the apparatus, and concluded his interesting remarks by showing a series of experiments, all of which were much applauded.

A vote of thanks was carried by acclamation to Dr. Fergusson for his communication.

The Secretary then read the

REPORT OF THE PRIZE COMMITTEE.

When the present Session commenced, it was announced that two Prizes would be awarded by the Society. The Register Fund Prize was to be given for the best Essay on any subject connected with Pharmacy, the Council leaving the selection with those who intended to compete. The President's Prize was in like manner offered for the best Paper on the "Different Kinds of Manure," and the time allotted for the preparation of these Essays was respectively from 13th November till 1st and 22nd March.

The Council regret to intimate that only one Paper has been lodged with the Secretary, and the subject there treated is the one named for the President's Prize. The Committee appointed have made the following report:—"Having carefully read and considered the merits of the Essay, decide, that while the Society's Prize cannot be awarded for this Essay as an original production, recommend some work on Chemistry be presented as a reward for the perseverance displayed in compilation, and for the trouble and time expended in writing the Paper."

The Prize having thus not been awarded, the Secretary has not yet opened the sealed envelope, but will do so without delay, and communicate the decision of the Committee, as well as forward the volume to the writer.

The Council take this opportunity to state that both Prizes will still be continued for competition, and the period allowed will be from the present date onwards till 1st October, by which time those who intend to compete will require to lodge their Essays with the Secretary. The Council still adhere to an opinion formerly expressed, that a good as well as a practical subject for a Paper would be "On the Best Mode of Preparing Tinctures," but while they make this suggestion, will be glad to receive Essays on any Chemical or Pharmaceutical operation.

The President then delivered the following

VALEDICTORY ADDRESS.

Gentlemen,—With the proceedings of this evening, we conclude another session of the Scientific Meetings of the Pharmaceutical Society, during which period we

have had some interesting and able communications. We may take a brief glance at what has been done during the session. In November we had an interesting paper from Dr. Macadam on the Chemistry of the Stars, and an account of the proceedings of the Council in London regarding the "Poisons Bill," by Mr. Macfarlan, our representative at the Council Board. If a bill on this subject should be brought forward at any future period, I feel satisfied that it will be very much improved, compared with any previous proposals.

In January we had a very important lecture by Prof. George Wilson on the Manufacture of Lucifer Matches, showing the dangerous nature of the occupation, and that matches have been used by some as a poison. There was a case happened in this city about the time the Professor delivered his lecture, in which a child having sucked some matches that were lying on the floor of the house, died on the following day. At the same meeting Mr. Macfarlan favoured us with a long and interesting paper, giving a detailed account of the numerous experiments made by Mr. Phillips on Methylated Spirit, for the Inland Revenue. All his experiments went to prove that the Government, in permitting the use of methylated spirit, free of duty, were correct in their calculation that it could not be rendered palateable. This was shown by Mr. Macfarlan in a paper read before this Society in January last year. For the donations to our Museum of the specimens of Mr. Phillips, Mr. Macfarlan deserves our best thanks. We had also at this Meeting the pleasure of a visit from Mr. Jacob Bell, the President of the London Society, and had the benefit of his valuable assistance at the Examinations during the day, and at the Meeting in the evening. A full Report of this Meeting appeared in the Journal for February.

In March we had Dr. Macadam, in his usual interesting style, on the Correlation of Forces, and Mr. Hart exhibited his Electric lamp. He deserves great credit for his improvement of this light, and I hope he may be able to turn it to some practical advantage. At the present Meeting we have been much edified by Dr. Fergusson's able description of Winter's Electrical Machine—the first ever exhibited in this city, and we are much indebted to him for his kindness in having brought it before this Society. Mr. Mackay, likewise, deserves our thanks for his very useful paper on the Manufacture of German Yeast.

I cannot conclude without acknowledging the valuable services which Dr. Macadam renders on all occasions, with so much good-will, to those connected with this Society.

There has been a marked improvement in the attendance on the Scientific Meetings —more especially since we removed to these rooms; but I regret that so few have joined the Society during the past year.

And now, my young friends, before retiring from this chair, I must tell you that you have many advantages in this city, compared with other parts of the country, for attending classes where lectures are delivered upon all the subjects required by this Society, by the ablest men of the present age, and I trust you will not fail to avail yourselves of these so far as it lies in your power—you may never have the same opportunities again. I know many who are most anxious to come to Edinburgh for a year or two, for the purpose of attending the lectures delivered in our Colleges, with the laudable object of acquiring proficiency in their profession. You cannot imagine how many difficulties arise after you commence business, which prevent several from ever joining this Society. I trust those present who are not Members, will take this into consideration, and that they will find it to their advantage to join the Society without any further delay.

My duties as President being now terminated, allow me to return you my sincere thanks for the uniform kindness which you have ever shown to my imperfect attempts to discharge the duties of this chair. I feel assured this branch of the Society will continue to prosper under the care of our able friends, Messrs. Robertson, Mackay, and Smith.

THE ANNUAL MEETING

Was held on Friday, 7th May, in the Hall, 51, George Street, at four o'clock, P.M.,

MR. W. FLOCKHART IN THE CHAIR.

The SECRETARY read the

REPORT OF THE COUNCIL.

SINCE the last Annual Meeting the Society has been compelled to move from the rooms previously occupied, and this from causes over which the Council had no

control. There is, however, every reason to congratulate the Society on the very favourable change which has been made, for not only is the present museum room more commodious and better lighted than any they have yet had, but the accommodation in the large hall is more ample, and in every respect more comfortable, than any place in which the Society has ever been in the habit of holding their Scientific Meetings. The Council therefore confidently hope this movement may have given entire satisfaction, especially as during the bygone session Members and others have had opportunities of experiencing the benefits above referred to, and they take advantage of the present Meeting to express the hope that this new arrangement may induce a greater amount of interest in the proceedings of the Society than has as yet been manifested in working out the principal objects contemplated by the Pharmaceutical Society.

The Council cannot but express their sorrow that while several Members are annually dying out, so few are joining the ranks as Pharmaceutical Chemists. It is not denied that the chief support and strength of the Society in time to come is mainly to be drawn from Apprentices and other juniors entering the Society as Associates or Pupils; but on a full consideration of the good already done, and capable of being extended, the Council view with regret the small number of Chemists who have lately, and indeed for some time back, joined the Association. In Scotland, the great objection urged against joining the Society is the imperative payment, in one sum, of £15 15*s.*, which, as is well known, is now exacted in addition to examination by the Society's Board of Examiners. Now the Council feel satisfied that the money-payment is what prevents many from applying for admission. To tell all and sundry who object that the seemingly large sum is modified to those who join the Society early as registered Pupils, does not meet their case, nor does it satisfy them to say that if any original Member were to apply for Life Membership, notwithstanding all the money previously paid by each individual so applying, he would still require to pay £10 10*s.*, and then he would be in the same position as the new Member paying only £5 5*s.* more, and coming at once into the same position, and enjoying all the privileges of being connected with a regularly organized and powerful Society, possessing a Royal Charter of Corporation, and recognized and protected by an Act of Parliament. The gratis delivery of the Journal is another argument which might be used ; but all this does not lessen the one payment which some cannot and others will not, pay, and hence many stand aloof who otherwise would be most eligible and useful to the Association. So great has this objection now become, that the Council think the present a fitting opportunity of bringing before the Council in London the desirableness of considering whether or not some change might not be advantageously made in the single money-payment. By this it is meant, as to whether a bye-law might not be framed rendering it optional for Members after passing examination, either to pay in one sum, or to pay so much for entry money, and an annual payment for so many years after. There are, doubtless, difficulties in the way of doing this, but the Council urge that the whole matter be fully and fairly considered, from a belief that if some such arrangement could be followed out, many respectable and useful Members might be added to the Society from the present number of existing Druggists throughout Scotland.

The Museum is still in its infancy, and requires all the fostering care which the Members can give, in order that its value, importance, and usefulness may be increased and maintained. It is expected that additional show cases will be provided during this summer, and the Council look for considerable support in the way of donations, from all who wish to see the Museum put into a state of efficiency. The thanks of the Council are tendered to those gentlemen who have acted as Curators.

The Council are of opinion that the number of books now in the Library warrant the arrangement by which country Members and others may now be accommodated with the loan of volumes. A complete list will therefore be printed before the commencement of next Winter Session, and circulated among all connected with the Society in Scotland; and, appended to this catalogue, will be rules for the guidance of those who may take advantage of this privilege. With a view then to still further increase the usefulness of this department, the Council will be glad to receive contributions of books from those who may be inclined to present them to the Library, and such volumes may be forwarded to Mr. Ainslie, Mr. Young, or the Secretary.

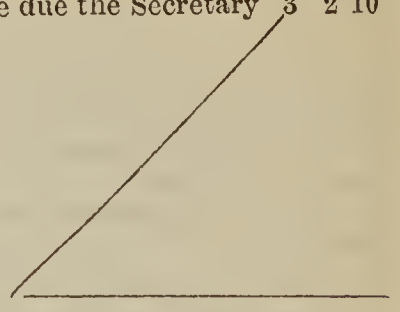
As usual, the following is a Statement of Accounts from the 1st of January to the 31st of December, 1857:—

Dr. *The Pharmaceutical Society in account with the Secretary.* *Cr.*

	£	s.	d.
Rent of Room	20	15	3
Taxes	1	16	0
Painter, 9*s.* 3*d.*—Gas, 2*s.* 7*d.*	0	11	10
Expenses at Annual Meeting	1	16	2
Ditto. Scientific Meetings during Session	2	2	0
Insurance	0	7	6
Printing	3	18	6
New Fittings in Museum Room	7	1	6
Plumber	0	7	2
Postage	2	5	2
Porterage, delivering billets, and cleaning room	1	2	6
Books for Library	10	19	9
Advertising	0	19	6
	£54	2	10

December 31st.
Balance due Secretary.....£3 2 10

	£	s.	d.
Proceeds of Wash-Stand, sold to Mr. Lambert	1	0	0
Nov. 7.—By Cash Remitted from London	50	0	0
Dec. 30.—Balance due the Secretary	3	2	10
	£54	2	10



We, the undersigned, have examined the foregoing accounts with vouchers attached, find them correctly entered and stated, and the balance due to the Secretary as at the 31st of December, 1857, to be three pounds, two shillings, and tenpence sterling.

JAMES GARDNER.
WILLIAM AINSLIE.
DAVID STUT.

Edinburgh, May 7th, 1858.

Glancing at the proceedings of the Society during the bygone year, the Council cannot but congratulate the Members upon the favourable position it occupies, and the continued state of prosperity it enjoys. Already some of the public Boards have recognized the claims of the Society and receive its certificates of proficiency in Chemistry and Pharmacy with confidence. Again, during the discussion and excitement of the Sale of Poisons Bill the Society was not only listened to, but their co-operation requested by the very framers of the contemplated Act of Parliament, and even now the present Government are not overlooking the important practical suggestions which may be derived from the Society. The examinations of the Associates are also becoming gradually more severe, and as Members by Certificate disappear, there is every prospect of the Diploma of the Society becoming what is has all along been intended to be—a proof of the education and proficiency in Pharmacy, Chemistry, and Botany of those who can, in accordance with the Rules of the Pharmacy Act, assume and use the title of Pharmaceutical Chemist.

Edinburgh, May 7th, 1858.

Mr. SMITH (of St. Andrews) moved the adoption of the Report, giving his hearty concurrence to an alteration in the manner of paying the fees, if such a plan should be proved practicable after the Council in London had duly considered the matter. After some further remarks from one or two Members agreeing with Mr. Smith, the Report was unanimously agreed to.

Mr. J. F. MACFARLAN proposed that Mr. James Robertson be elected President, and Mr. Smith of St. Andrews, Vice-President for the next year. Mr. M. mentioned, that from the state of Mr. R.'s health during his former Presidency, the Society did not reap the full benefit of his services, and he was glad that his restored health now gave him an opportunity of proposing his re-election. Mr. Smith had been one of our first Examiners and Councillors, and he had much pleasure in proposing that he should be Vice-President.—Carried with acclamation.

Mr. AITKIN named as Members of Council, the President and Vice-President, Messrs. Ainslie, G. Blanshard, Flockhart, Kemp of Portobello, Young, Tait, R. Raimes, Lindsay, Gardner, Macfarlan, Hart of Glasgow, and Brown of Dunfermline.

Mr. G. BLANSHARD proposed as Examiners, President, and Vice-President, Messrs. Flockhart, Baildon, Gardner, Tait, Macfarlan, Mackay, President and Vice-President in London *ex-officio*.

Mr. FLOCKHART proposed that Mr. Macfarlan be requested to continue his valuable services as a Member of Council in London.

The CHAIRMAN moved that Messrs. Ainslie and Young continue to take charge of the Museum and Library.

Mr. ROBERTSON proposed the re-election of Mr. John Mackay as Secretary, which was carried by acclamation.

THE ANNUAL DINNER.

The Annual Dinner came off in the evening in Young's New Royal Hotel, Mr. JAMES ROBERTSON in the Chair. Mr. SMITH, St. Andrews, acted as Croupier, and among those present were—Mr. J. F. Macfarlan; Mr. Thomson, London; Mr. Scott, London; Mr. Aitken, Mr. Mackay, Mr. J. Gardner, Mr. Flockhart, Mr. Logan, Mr. Blanshard, Mr. Sang, Mr. W. Baildon, Mr. Young, Mr. Finlayson, Mr. Ainslie, &c.

After dinner the CHAIRMAN read notes of apology from a number of individuals, and thereafter gave the usual loyal toasts, which were heartily responded to.

The CHAIRMAN then proposed "The Pharmaceutical Society," in doing which he said the aim and object of the Society had been so frequently and so ably brought under their notice, that he deemed it unnecessary for him to go into anything like detail. He would simply remark that they were nearing their majority. It would be somewhere about sixteen or seventeen years since this Society was instituted, and that under the auspices of but a few individuals. After a deal of labour, assiduity, and anxious toil, they got from time to time such powers conferred upon the Society as could not fail ultimately to prove of very great benefit to themselves as a body, and to the public at large. It must be admitted, however, that those privileges and advantages were still short of what the Society deserved, and what it would require to bring it up to the point that would make it really and truly useful. He felt that they must inscribe upon their banner, patience and hope, as well as perseverance. They should unite in the bonds of friendship and true and good feeling, so that when they knocked at the door of Government they would be found worthy of any patronage that Government might choose to give.

Mr. MACFARLAN proposed the health of Mr. Flockhart, the retiring President. He alluded to the various matters which were prominently brought out during the time Mr. Flockhart was in office, and testified to the many good services he had done to the Society.

Mr. FLOCKHART briefly responded.

Mr. YOUNG gave—"The President, Vice-President, and Council in London." Whatever opinion, he said, they might form of the President of the Association, unquestionably he would be recognized by posterity as the founder of the Society—as, in fact, its mainstay during its earlier years. When it was also borne in mind that lately the Society here had, for the first time, had a visit of its President in his official capacity, who took part at its meetings, and who, he believed, had a seat at its Examining Boards—it was all the more needful that they should do the toast all the honour in their power. In regard to the Council, he believed that any one who had paid attention to their doings, must be satisfied that they conducted the affairs of the Society not only wisely but well. The good ship was now comparatively in smooth water. There were now no rocks ahead; her trim sails were being gently expanded. The breeze was coming from the proper direction, and he had no doubt that in a short time she would reach the desired haven, when they would have their legitimate rights, and maintain that position for which they had so long struggled.

Mr. MACFARLAN made a suitable reply on behalf of the President and his brother Councillors.

The other toasts were—"Pharmaceutical Education," by the Croupier; "The Honorary Members of the Society in Scotland," by Mr. D. R. Brown; "Members from a Distance," by Mr. W. Baildon; "The Board of Examination and Council in Edinburgh," by Mr. Aitken; "The Visitors," by Mr. G. Blanshard; "The Chairman," by Mr. Ainslie; "The Croupier," by the Chairman; "The Associates and Apprentices," by Mr. Mackay; and "The Secretary," by Mr. Macfarlan.

A number of excellent songs were sung during the evening, and the proceedings were characterised throughout by the utmost harmony and good feeling.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

Royal Institution, 22nd April, 1858.

H. S. EVANS, ESQ., IN THE CHAIR.

Mr. Watson Peck was elected a Member, and Mr. J. W. Wade an Associate.

The SECRETARY announced the following donations to the Museum and Library: Thirty mounted Botanical specimens from Australia; specimen of the Epidermis taken from the "Tea Tree" (an Australian plant); and thirty-five mounted specimens of British plants, from Mr. A. Redford; Bengal and Madras Turmeric, from the Museum of Applied Science; the General Index of the first fifteen volumes of the *Pharmaceutical Journal*, from Jacob Bell, Esq., London.

Dr. EDWARDS introduced to the notice of the meeting a preparation under the name of Glonoïne, which he stated was used by homœopathic practitioners, and gave some interesting information respecting it.

The President, H. S. EVANS, Esq., then read the paper of the evening,

ON THE PHILOSOPHY OF FOOD.

The lecture occupied some time in delivery, and was throughout marked with evidence of a clear and intimate knowledge of the subject, and was listened to with evident interest and attention. After which Mr. ABRAHAM proposed a vote of thanks to Mr. Evans, which was carried by acclamation

Royal Institution, May 6th, 1858.

THE PRESIDENT IN THE CHAIR.

THE following donations were announced by Mr. SHAW:—Two parts of Muspratt's Chemistry, from Mr. Wright; Mexican Fibre—the produce of a species of Cactus, from Mr. Clay; and Flavine, a yellow colouring matter, extracted from the Quercitron Bark *(Quercus Tinctoria)*, from Mr. Clapham.

Dr. EDWARDS then proceeded to deliver the lecture of the evening,

ON SILICIUM AND ITS COMPOUNDS.

Dividing the subject as follows:—Sources and properties of Silica; Oxidation, Silica or Sand Compounds with Alkalies; Mineral Gum; Glass—soluble and insoluble, fusible and hard; white, green, and stained. Porcelain and Stoneware, Mortars and Cements; hard and soft building Stone. The lecturer entered very fully into the chemical character and history of Silica, enumerating a great number of substances in which it forms the chief ingredient; he also explained the constitution of various gems and precious stones, and some mineralogical specimens—a considerable number of the latter being on the table for inspection and for illustrating the lecture, and which were examined by a number of Members with great interest. At the close, the President proposed a vote of thanks to Dr. Edwards for his interesting and instructive lecture.

ORIGINAL AND EXTRACTED ARTICLES.

ENGLISH AND FRENCH PHARMACY.

BY MR. INCE.

HE would be an ingenious man indeed, who could point out two greater opposites than Cheapside, London, and the Rue Royale, Brussels: the one all dash, and drive, and bustle, the other like the Beauty in the wood—a hundred years asleep. The first, with a crowd of restless, jostling, money-making spectres; the second, enlivened by a few Belgian ladies, and an occasional tourist. Animated with a Columbus spirit of discovery, I once entered a Brussels Pharmacy—time twelve o'clock mid-day, weather splendid, London business thermometer at 112° Fahrenheit; but where, and oh where, was my Belgian Chemist gone? There stood the shop, with its great jars of Pâte de

Réglisse, Pâte de Jujûbe, and Pastilles de Guimauve, useful but not strong remedies: there stood the rows of extract pots, blue Chinaware, with bright gold labels, with the last glow of the Lowther Arcade upon them: there stood glasses with rolls of issue-peas and saccharated capsules: there stood a miniature case filled with Albespeyre's paper, Camphor Cigarettes, and Blanc de Perle. These were the only things which did stand, for in a sort of back parlour (land appeared in view) there sat the master—sat and smoked complacently. By degrees it slowly dawned upon him that there *was* a customer, and he emerged, pipe in hand, looking something between a bandit and a Plymouth brother. The small retail order was duly executed, and he went back to his resting-place, while I returned to mine.

Let the scene change to Paris. I have a young friend an Assistant in a celebrated French establishment; while deep in conversation with him, two ladies enter. Business must be attended to—my companion, therefore, hastens to his post.

There I sat, waited, and listened while the fair customers gave a graphic summary of most things under the sun, including the new opera, the last vaudeville, the state of the funds, and the expected comet. The Lay of the Ancient Mariner was not longer nor half so pleasant. Having concluded these opening observations, they glanced at the weather generally and the public health, which latter topic led them to reflect that one object of the morning visit was to buy some physic.

These two occurrences led me to reflect instinctively that the life of the French Pharmacien differed from that of the English Pharmaceutist, at least in its external character; and being a Chemist myself, I determined to see whether there might not exist other and more special points of difference than those suggested by a superficial glance; and as one object of travel is to draw practical results from mere amusement, I thought it not idle to work out the subject, and proceed to weightier matters.

The country in relation to the country Druggist will aid in establishing a just comparison.

Every young man with a spark of ambition in him, wants to come to London, because it presents a wider field of observation than can be obtained elsewhere; it allures with the chance of a first-class situation, and the strong hope of consequent improvement, besides offering the certainty of seeing and knowing more than can be expected in the narrow limits of a little town. London, too, has a School of Pharmacy, with excellent lectures, and a Museum, to which, though this is not generally known, is attached a Library. Influenced by these advantages, the countryman deserts his fields and comes to town; works very hard—stares at every Chemist's window—takes amazing notes, and has a monomania for self-culture. But no sooner has he acquired as much as he thinks requisite, than the ultimate object of his ambition is to regain the country, where he thinks, and rightly thinks, that his late experience and his London name may favour his success.

Across the Channel, the country is the last place to which the provincial Pharmacien would choose to go; not that he is spell-bound by the fascinations of the city, as Eugène Sue declares, for the necessities of life are rude disturbers of the romantic notions found in novels; nor yet that he has an insane love for the hot air and crowded streets of Paris, but because outside its walls he meets with an unexpected rival, the Religious House.

A slight explanation is necessary in order to understand the case. Before the general spread of education, the inmates of these houses were the sole conservators of knowledge, and therefore were alone capable of practising the art of healing, hence medicine and piety went hand in hand. Such a community was a real blessing in a country town; the Convent Dispensary was a charity in the noblest sense—the nuns displayed excellent tact, and supplied good physic. But when through the length and breadth of France education became

universal, a new order of things arose. The Physician first caught the genial inspiration, and the Pharmacien next. A School of Pharmacy was established, which exacted certain duties, entailed grave expenses, and conferred distinct privileges in return. As one incentive to closer application, it authoritatively declared that none could practise Pharmacy who had not obtained a first-class diploma. On the faith of this edict the Paris student hastens to the seat of learning, hires a back room in a back street in the Quartier Latin, eats one franc dinners, dreams of Oxygen, and nearly works his heart out. Up to this point the career of the English and French student is almost identical; in each case the same influences are at work; there are the same hopes to stimulate, the same difficulties to overcome, and the same goal to reach. But here Jean Jacques bids farewell to John James, and having passed his examinations with distinction, packs up his books, and commences business in a country town.

There he discovers to his horror a large establishment directed by nuns, without a title and without diploma, and consequently under neither responsibility nor guarantee. Besides this (and the statement is taken directly from an actual sufferer), in most of the principal towns "there exist Pharmacies without Pharmaciens, directed by religious communities of various orders, who, under the title of hospital, hospice, or house of charity, prepare and sell all Pharmaceutical products to the public, and make up the prescriptions of medical men. Such a system is injurious—

"1. To the development of Pharmaceutical Studies:

"2. To the prosperity of Schools, or Faculties of Pharmacy, as well as to a great number of district Colleges:

"3. To the station and fortune of all young men who, having completed their studies, seek in Pharmacy an honourable position, sufficiently lucrative to allow them to bring up their families:

"4. To the public safety."—(*Hthe. Fortoul, Journal de Chimie Médicale.* Janvier, 1858.)

It is a bad case indeed which has no friends, and this licensed illegality finds a strenuous defender in the wholesale Paris Druggist. Hint to this worthy individual the more than doubtful wrong committed, and he will hasten to rescue injured innocence. He will show you the great usefulness of these establishments in remote towns and villages, in desolate neighbourhoods and poverty-stricken hamlets; he will compare them to light in darkness, to a well in the wilderness, an oasis in the desert; he will tell you with a triumphant flourish, how they step in where there are no drugs and no Pharmacien, and in the end, will draw such a glowing picture, that you might become sensibly affected, did you not recollect that the orator supplied the wholesale order. In Paris no religious community sells its physic, charitable institutions buy their drugs from the Pharmacien at ordinary tariff prices, and no man, under any pretence whatever, can there practise Pharmacy unless he has obtained a diploma of the first class. Meanwhile what is the young aspiring Pharmacien to do? Should he, compelled by dire necessity, seek to establish himself in his native town, he must meet the expenses of a small business in painful contrast with an increasing family; must raise the money for his rent, taxes, and patent licence, and at the same time be prepared to battle with a huge monopoly which appeals to the sympathy of both worlds, and haunts him day and night. The dreary struggle cannot last for ever, and one fine morning there is a Druggist less. Up go the shutters.

A second point of difference exists with regard to counter-practice and the indiscriminate sale of drugs. How often do we read in the advertisements of this Journal, of a business which is recommended as "doing a snug retail with a counter-practice." It is precisely the snug retail which requires this aid the most, and many a dismal-looking shop, with its dreary bottles and dusty windows, planted in a dense and dirty population, is turning its mixtures, pills, and lotions into gold by the alchemy of counter-practice.

There are establishments in London where, I am told, there is no retail trade whatever, which are nevertheless held in much repute by the parochial Bank; and in my humble opinion a good Pharmaceutist is better than a bad Surgeon.

But let success attend the business, let it branch out and set up its plate-glass windows in the West-end, and just in proportion as the snugness vanishes, the counter-practice dies. The sale of drugs, however (like the king) never dies, understanding the word "drugs" in its broadest and most comprehensive sense. What is there short of Prussic Acid which the English Pharmaceutist will *not* sell? What is there short of Strychnine which his customer cannot buy? With respect to such transactions, the law in France hangs over the Pharmacien like the sword of Damocles, and, however often he may escape the penalty, he is conscious of treading on forbidden ground, and fears lest at any moment he should be detected. Yet, I venture to assert, that there are not six shops in London where medical advice on ordinary casual maladies is not afforded, and that there are very few remedies, not of an absolutely dangerous character, that would be denied to a retail customer. The rule in such cases is not definite, some houses are infinitely more strict than others, but the main fact is undeniable, that both advice and remedies are given here under circumstances that would not be justified in France. Well do I recollect a long and fruitless chase after one drachm of Iodide of Potassium. It was my first and last knight-errantry. It would seem, from the following instance, that French law is as strict as ever.

SALE OF CHLOROFORM.

On the 9th of August, 1857, at nine o'clock in the evening, the Commissioner of Police, belonging to the section of the Champs Elysées, received notice that a person unknown had just attempted suicide in an hotel.

The Commissioner of Police went there, and saw in a room a man who appeared to be about forty, lying on a bed in a very dangerous state. A medical man who had just attended, prepared to take him to the hospital. The patient was scarcely put in a cab before he expired. The unhappy man, not being able to give an explanation with regard to himself, and having no papers on him by which he could be recognized, was carried to the Morgue. An inquiry was commenced, of which these are the particulars. On the day the suicide was attempted, the individual in question presented himself at the hotel, and asked for a room, in which he shut himself up. Some hours after, the waiter, who was serving in an adjoining room, heard groans, and informed his master, who hastened up-stairs and knocked at the door from whence the sounds proceeded. It was then that they found the man lying down, and called in a Physician, who immediately detected poisoning by Chloroform. The bottle which had contained this substance was produced in evidence, as well as a bill showing the sale of 150 grammes of Chloroform by P., Pharmacien to L., *also* Pharmacien. (To this bill was attached a prayer to the Virgin.) On this account P. was sent before the correctional police for *having, contrary to law, sold a poisonous substance without the prescription of a medical man,* or without the name and residence of the buyer. The suicide was identified, when it turned out that the name the individual had assumed when he bought the Chloroform, was not his own, but that he was a Paris tradesman.

The defence was that the individual had declared himself a Pharmacien, and his word was taken for it.

The Court condemned the defendant to six days' imprisonment, and a fine of 1000 francs.

Now, just suppose in England a man coming into a Chemist's shop, asking for one ounce of Chloroform, with a statement that he knew its nature, properties, and use—that he was himself a Chemist, and wanted it for his own purposes; would he be denied? But in France the majesty of law is absolute, its authority usurps the place of personal discretion, and in its further

interference leads us to a third point of difference between English and French Pharmacy.

Wonderfully would the English Chemist be astonished were his meditations to be interrupted suddenly by a committee of inspection. How little would he like to see the invading troop examine the contents of his shelves, ransack his cupboards, and explore his drawers. True, indeed, within the boundaries of the City, the College of Physicians, as represented by its censors, is still in the practice of visiting Chemists' shops—nor is their work superficially performed, for they carry with them hydrometers and a few simple reagents, and when anything amiss is found they cause an official letter to be addressed to the peccant Chemist; but, beyond the gates of Temple Bar, their visits are like the angels', few and far between. Let the prudential Chemist avoid the County Court, and he may make his physic as he pleases, and so long as he hurries no one to an untimely tomb, may keep the even tenor of his way. The British public are left entirely free to purchase genuine medicines at a fair remunerative price, or to have them cheap, combined with the usual adjective of nasty, and no man deludes himself as to the actual value of the article he buys, whilst, on the Chemist's part, self-interest proves the surest antidote to fraud.

When a man deliberately waters his tinctures, falsifies extracts, adulterates drugs, and is content generally with inferior quality, the public is equally content to go elsewhere, and refuses to be dragged back even by persuasive circulars or flaming placards. On the other hand, the English Chemist never hesitates to adopt those methods of preparation which discovery, design, or accident afford. If in the course of a practical, laborious life any improvement in manipulation should be suggested to his mind, he lets his experience, not his Pharmacopœia, direct him; and it is the pride of some houses (as well as an undoubted truth) that they prepare certain remedies much better than other people. No one is injured, for intelligence will, sooner or later, win the day; put a fool into an Irish bog and he will die of cholera—put a wise man there, and he will turn it into Peat Charcoal and Paraffine.

Twelve hours and thirty shillings will conduct the adventurous Chemist to another scene, where he will find a commission of inquiry in full and active operation; not a decayed, venerable institution, but a living, energetic power. The twelve hours' journey is by no means necessary, for the pages of the *Journal de Chimie Médicale* will furnish the amplest information on this point.

Here we find, for instance, in April, 1857, that "Jean Baptiste Chevallier, Chemist, Professor at the Head School of Pharmacy in Paris, Member of the Imperial Academy of Medicine and of the Board of Health (armed to the teeth with legal points and technicalities), comes down on an unfortunate Pharmacien in the section Place Maubert. Of five of the bottles examined, labelled as containing various distilled waters, four are found filled with Aqua Destillata, and the fifth with common water. The Syrup of Quinine is mouldy, and has not been prepared according to the Codex—the Epsom Salt turns out to be Sodæ Sulphas—and two keys belonging to the poison cupboards are left unguarded, contrary to police regulations. Verdict: fifteen days' imprisonment, and a fine of fifty francs." This wholesome inspection is far from being limited to a case of fraud, for the utmost rigour of the law visits all preparations which are not made in strict accordance with the Codex. By the decision of the Parliament of Paris, July 23rd, 1748, the offending Pharmacien is liable to a fine of 500 francs. This decision was formally confirmed with regard to its penal character by the law of 21 Germinal, year XI. (April 10, 1803).

Fortunately I have before me the report of a trial at Lille, which affords an excellent example.

On November 14, 1856, a Pharmacien was seized for having sold "Sirop Anti-scorbutique," which was not prepared according to the Codex. [This is the Sirop de Raifort Composé, and is directed to be made with various leaves and

roots, macerated in white wine. After two days' maceration, it should be distilled in a retort over a water-bath, and a fourth of the wine drawn over, in which half the prescribed sugar is to be dissolved. The contents of the retort should be pressed, strained, and made into a syrup with the remaining sugar; both syrups are then mixed together.]

The Syrup in question was made with an inferior wine, and was prepared by cold maceration instead of being distilled. The defence was, that it had been bought from a wholesale Druggist; the Pharmacien was therefore cleared, and the authorities went to the right place and found out the right man.

The accused said, first of all, that he had made the syrup by a formula given in *l'Officine*, a work of Dorvault, often used in Pharmacy; secondly, that he sold it as a Drug-merchant, not as a Pharmacien; thirdly, that the law with regard to the preparations of the Codex had been annulled. The Court decided that every Pharmacien was under an obligation to have a copy of the Codex, and absolutely to follow its directions; secondly, that the penalties consequent on its infraction remained in force; thirdly, that the syrup had been made by the accused not as a Drug-merchant but as a Pharmacien, there being an express law that no Drug-merchant should either prepare or sell any Pharmaceutical product, but simply drugs; and lastly, that as the syrup sold was made otherwise than according to the directions of the Codex, the usual sentence must be pronounced—a fine of 500 francs, and costs of trial.

Were such a commission to make a provincial tour in England, would it be hailed with the words, "Welcome! little stranger!" and would the delighted Chemist illuminate in coloured lamps, choosing for his device the cabalistic sign P. L.?

Willingly would I complete the subject without venturing on the last, and greatest, point of difference between English and French Pharmacy, the use of private formulæ and secret remedies. There is scarcely an English journal, medical or otherwise, which does not bristle with marvellous specifics and romantic cures. The language of Chemistry is exhausted to produce new terms, while one compound treads on the heels of another, labelled with a name which Cardinal Mezzofanti himself would be unable to pronounce.

With eagerness does the modern Chemist abandon the old paths of Pharmacy in haste to conjure up his fancy combinations with all the dexterity of Herr Frikell, for these are fastidious times, in which common salt is not good enough for common people, and in which even the domestic comb and brush must be galvanic. One branch of this mania for supposed discovery has issued in a nuisance—the perpetual introduction of small fiddling chemicals, which disgust the mind and overrun the cupboard. No sooner is the new compound hatched, than it is recommended, *nolens volens*, to the Physician, who prescribes it for about one week, after which brief sojourn in the world below it disappears for ever. Not content with chemicals, some quiet root in Western Africa is torn from the society of the adjacent niggers to become a Liquor; or some harmless, homely vegetable, grown near Putney Bridge, is raised to the dignity of an Extract. From the union of these forces the Chemist is duly favoured with a prescription something like the following:—

℞ Zinci Ammonio Tannat ℈j.
Liquor Peculiaris Higgens ʒss.
Aquæ Anodynæ ad ʒviij.
♏ Sumat coch ij. ampla, bis vel ter in die.
℞ Ext. Dauci Carotæ ʒj.
(Walker's).
In pil xij. divide quarum sumat unam hora somni O. N.

April 1, 1858.

An active porter in seven-league boots is required to chase after and keep pace with the galaxy of nostrums: they are bought, however—the cost price, retail and wholesale prices duly affixed; they scarcely, if ever, repay the

original outlay, and, in addition to this annoyance, there is another row of nasty little bottles for the eye to contemplate.

These are but drops in the ocean compared with the long list of advertised secret remedies—a subject too vast, too delicate, and too disheartening for me to undertake ; nor would I have glanced at its troubled waters were it not to describe the diametrically opposite course pursued abroad. Nothing can be more strict than the execution of the law in France, which utterly puts down all private formulæ and secret remedies. Charity, so called, cannot smuggle in a benevolent ointment, still less can either ambition, gain, or quackery, invade with impunity the sacred precincts of the Codex. No wandering herbalist can usurp the physician's place;—no pious clergyman can commit a pious fraud, and relieve the nerves of suffering humanity for half-a-crown;—no Eastern traveller can open, gratuitously, the eyes of his fellow-creatures with his Turkish salve—please to enclose six stamps,—and no energetic Chemist can publish a weekly catalogue of novelties, and continue to receive from the profession fresh testimonials of his skill. Facts are stubborn things, let three of these stern witnesses suffice :—

L———, a herbalist, appeared before the Correctional Tribunal charged with illegal practice of Medicine and Pharmacy, and with acting contrary to the Royal Edict of October 29, 1846, by mixing a poisonous substance in a preparation which could only be sold by a Pharmacien for medical use. He had prescribed the remedy for a woman who had cramp and colic. No sooner had the dose (two table-spoonfuls) been administered than she became dangerously ill. An analytical Chemist said that it was an ammoniacal liniment, which should only be applied externally, and which also contained a double amount of the ammonia indicated in the Codex. A medical man declared that a dose of ammonia like that given by the herbalist, taken internally, might produce serious results, and even endanger life. The facts being proved, L——— was condemned to ten days' imprisonment and a fine of 200 francs.—(Jan. 1, 1858)

At the same time and place, P———, a Pharmacien, was charged with having sold a secret remedy to which he gave his name. This remedy was announced to the public by an immense placard attached to the shop-windows, on which was inscribed the following notice :—"A gratuitous distribution of Balsam P———, for the cure of wounds, ulcers, burns, tetters, &c., takes place for the poor every Saturday and Thursday, from seven to eight o'clock in the evening, at the Pharmacy of the inventor, under the special and gratuitous direction of a Doctor of Medicine of the Faculty of Paris." P——— was condemned to a fine of twenty-five francs.

Pommade B.

A seizure was made a short time ago at the establishments of the makers and sellers of the Pommade B., brought forward as a remedy for fleshy excrescences, gatherings, burns, wounds, ulcers, large boils, and corns. For this, Messrs. B——— and V——— were sent before the correctional police. B——— is much surprised that an action should be brought against him *now* on account of the sale of a pommade which has been sold peaceably for the last fifty years, from father to son, the recipe being a secret in the family. It is precisely because it is a secret that the Court condemns Messrs. B——— and V——— each to a fine of fifty francs.

See, lastly, how affairs are managed in that quiet old city, Antwerp. "The Pharmacien-in-Chief of the Hôpital du Midi, M. Personne, twice Prizeman (Lauréat) of the Paris Pharmaceutical Society, and author of many important chemical researches, presented himself before the Antwerp Pharmaceutical Society as a candidate, and was rejected. The advertisements in the papers of Personne's Iodized Oil were the sole cause for this exclusion. Honour to the Pharmaceutical Society for having, in so striking a manner, given a lesson of professional dignity to all these specialists and advertisement-mongers who spring up (pullulent) in Paris."—(*Journal de Pharmacie Anvers*, Dec., 1857.)

Now we are in a better position to arrive at some definitive conclusion with

regard to English and French Pharmacy. Both systems have their merit. The first relies on commercial honour, the second on minute external regulations.

To these latter may in part be attributed that curious, apathetic, easy manner, which characterizes our foreign brethren, and which never fails to arrest the attention of a stranger. The man who is hemmed in till he scarcely feels his soul his own, is led to treat external circumstances in a somewhat philosophic manner. How far in England such a plan would answer, it is not for me to judge; I think, however, that it would hardly suit our national temperament.

This, at least, may be granted, that without the agency of legal interference, there is no more diligent, accurate, or scrupulously conscientious man, than the English Pharmaceutist; nor do I believe that in any other profession, trade, or calling, there is an exhibition of a more continuous, unwearying, microscopic application than in an English Pharmacy.

31, *Southampton Street, Covent Garden.*

ARSENIC IN PAPER-HANGINGS.

BY B. H. PAUL, PH.D.

Dr. Taylor's remarks in the last number of the *Pharmaceutical Journal*, relating to the account of Mr. Campbell's experiments,* appear to question both the sufficiency of those experiments to disprove the volatilization of arsenic from emerald-green paper-hangings, and the fitness of the remark that their result is contrary to the opinion expressed by Dr. Taylor as to the probable effects of such paper on health. Those remarks appear at the same time to imply, that, in pointing out the apparent improbability of prejudicial effects arising from the occupation of rooms hung with such paper, I was guided by the opinions of the arsenic-pigment makers. I wish, therefore, to direct attention to the fact that this was not the case, by particularizing, more fully than would otherwise be needed, my reasons for differing from so high an authority as Dr. Taylor.

It would be superfluous to explain to the readers of this Journal, that in the attempt to arrive at some satisfactory conclusion as to the alleged influence of emerald-green wall-paper, the idea of volatilization being the only possible mode in which such influence could be exercised, is not unwarrantably speculative. Hence, notwithstanding the known fact that emerald-green bears considerable elevation of temperature without disengaging arsenical vapours, the first impulse of a chemist, examining this question, would be to ascertain whether arsenic could or could not be volatilized from the wall-paper under the conditions in which its influence is alleged to have been exerted.

Dr. Halley, in his letter to the *Times*, distinctly put forward the opinion that emerald-green paper-hangings are liable to produce injurious effects, in consequence of the volatilization of arsenic. This public announcement was not noticed by Dr. Taylor, and that I did not altogether misrepresent him in supposing that he also entertained the possibility of volatilization, will, I think, appear from the answer to question 1189, in the evidence on the Sale of Poisons, in which, speaking of emerald-green wall-paper and the mode in which its influence might be exercised, he is represented to have said that the "vapours" might be about the room.

From the account given of Dr. Halley's experiments, they certainly do not establish the fact of volatilization, and in the absence of more precise detail, they do not invalidate Mr. Campbell's result.

However, Dr. Taylor objects to the negative inference from Mr. Campbell's experiments, on the ground that they do not practically establish anything with respect to the question at issue. I presume this may be understood to imply that those experiments do not disprove volatilization of arsenic from emerald-green paper. But if the volatilization of arsenic from wall-paper, under the conditions prevailing in an inhabited room, was of sufficient magnitude to produce the symptoms experienced by Dr. Halley within a few days, with threatened paralysis in three weeks, although the suspected room was occupied only five

* See *Pharmaceutical Journal*, xvii., 520.

or six hours daily, and, I presume, ordinarily ventilated meanwhile, I cannot but think that, considering the quantity of emerald-green on a square foot of wall-paper, the large quantity of air that would be passed over its surface in the course of an hour, and by passing it through a close bottle, made to come in contact with the arsenical pigment, as well as the extreme delicacy of the tests for arsenic, and the absence of any trace of arsenic in the alkaline solution through which the air was afterwards passed, even when the temperature of the air was so high as 140° F., the inference of non-volatilization was as fully justified by the result of Mr. Campbell's experiments, as it was consistent with all that is known of the characters of emerald-green.

But it is now unnecessary to insist more fully upon the sufficiency of Mr. Campbell's results to disprove this volatilization of arsenic, for since their publication, Mr. Abel has made some further experiments in connexion with this subject, in which the opportunities for volatilization, and for detecting any arsenic that might be volatilized, were very much increased. In one instance, the air of a room hung with emerald-green paper was tested after th eroom had been kept closed for thirty-six hours; in another, air at a temperature of 90° F. was passed for a whole week over the paper, at the rate of half a cubic foot per hour; in another, the paper was roughened by friction before passing air over it; and in another, 600 grains of emerald-green, entirely unprotected by size, and diffused through enough cotton wool to fill a half gallon jar, was subjected for a week to a continuous current of air at 90° F., but in no instance was a vestige of volatilization observed, and the general result is simply a confirmation of that previously obtained by Mr. Campbell.

It follows, therefore, if volatilization—which is, to all appearance, the only conceivable mode in which the influence of arsenic could be exercised—is disproved, and if, in Dr. Halley's and other cases, the only conceivable source of arsenic was, as is stated by Dr. Taylor, the green paper on the walls, these facts alone would appear to render the alleged influence of emerald-green paper-hangings extremely questionable. In addition to this source of dubiety it may, I think, be questioned whether the symptoms observed in these cases are so specifically characteristic of arsenical influence as to admit of no other explanation. Without attempting to offer any decided opinion on this medical question, I may at least state my belief that in the absence of any apparent mode of action, the occurrence of the symptoms in connexion with the occupation of rooms hung with emerald-green paper, does not prove that these circumstances bear the relation of cause and effect. Just in the same manner, the death of a person under symptoms similar to those experienced by Dr. Halley would not be legitimate evidence of death from arsenic, unless that substance were found in the stomach.

The cases of lead colic or lead paralysis resulting from sleeping in a freshly painted room, can hardly be compared with the cases of alleged influence of emerald-green paper-hangings, where volatilization is, *à priori*, so improbable, and as is shown by the results of experiment, does not take place. The former cases are sufficiently obscure, notwithstanding the fact that there would be unquestionably volatilization going on; but the breathing of the vapours of fresh paint would be a means of communication, of which, so far as existing evidence goes, no counterpart can be assumed to exist in the latter cases.

It now appears, however, that Dr. Taylor does not adopt the theory of volatilization, but leans rather to the opinion of the *Bavarian* chemist, Pettenkofer, that the influence of arsenical wall-paper is exercised by the mechanical diffusion of the emerald-green, as dust, through the atmosphere of a room, and he objects to the assumption that this cannot be the case. I am not aware that any one has been so bold as to hazard such an assumption, for undoubtedly mechanical diffusion would be as probable a mode of producing the effects of arsenic, as its vaporization; but it would certainly be desirable to prove such mechanical diffusion, or at least to ascertain its probability, before ascribing to it the occurrence of symptoms which, however similar to those produced by arsenic, are not in themselves sufficient evidence of its

influence. The burden of such proof rests with those who maintain a causal connexion between the occupation of rooms hung with emerald-green paper, and the symptoms alleged to be the effects of arsenic. There is nothing in Dr. Taylor's evidence to show that he adopted this view, and as Mr. Campbell's experiments were limited to the question of volatilization, the remark that their result was contrary to the opinion expressed by Dr. Taylor and Dr. Halley had reference only to the hypothesis of volatilization.

But, in other respects, the hypothesis of mechanical diffusion involves difficulties as great as that which assumes volatilization. It seems to have been suggested by Prof. Pettenkofer's observation of particles of green flock on a microscope glass that had been kept in a room where there was a flock paper. With regard to this observation, it appears singular that an arsenical paper should be in use in a country where such paper is prohibited by law. However, it is a fact by no means unimportant in connexion with this view, that the green flock from which minute particles may be easily detached, is not coloured with emerald-green or any other arsenical pigment, but being a woollen material, is of necessity *dyed*, and in the same manner as any woollen material is dyed green. In addition to this, the hypothesis of mechanical diffusion is rendered still more improbable by the fact, that in Mr. Abel's experiments the loose plugs of cotton wool inserted in the tubes connecting the test apparatus with the vessel containing the emerald-green paper, furnished no indication of the mechanical transfer of the pigment.

Which ever view is adopted, there is, as Dr. Taylor justly remarks, a difficulty in suggesting a perfectly satisfactory theory to account for these cases, and it strikes me there is an equal difficulty in recognizing any evidence of their connexion with the use of emerald green paper-hangings. Even if this connexion were established, I doubt whether the difficulty of accounting for the fact would not be increased. It was for this reason that, in stating the results of Mr. Campbell's experiments, I ventured to suggest that it might be worth while to investigate more minutely the attendant circumstances of the cases of supposed arsenical poisoning, for the purpose of ascertaining whether there might not be something besides the presence of arsenical wall-papers, common to all these cases, that would remove the obscurity which now hangs over the subject, and furnish a clue to some more probable cause of the symptoms observed. The suggestion that the burning of gas might be in some way connected with the occurrence of those symptoms, had not by any means the significance that Dr. Taylor appears to have attached to it, and was intended merely to excite inquiry. But even on the assumption that these symptoms were caused by the burning of gas, I must differ from him as to the probability of such cases being more frequent than if caused by arsenical paper-hangings; for while emerald-green is invariably poisonous, it is quite conceivable that gas may be so only in isolated instances.

The fact that the use of arsenical pigments for paper-hangings is prohibited in Prussia, cannot, I conceive, be taken as evidence that the practice is injurious to health. There are a number of other prohibitions in Prussia, the object of which it is not easy to perceive. Thus, smoking tobacco in the streets of Berlin is prohibited, although it is practised extensively in other towns without any apparent evil consequences.

With regard to the precise cause of the symptoms experienced by Dr. Halley, while occupying the room hung with green flock paper, and of their disappearance after the substitution of a wainscot oak paper in its place, I cannot admit that in questioning the evidence brought forward to show connexion between these facts, it is necessary to account for the occurrence and disappearance of the symptoms. If this were necessary, I should be disposed to regard the case as somewhat analogous to that of the experiments with glonoine, reported in the last number of the *Pharmaceutical Journal;* but those who are acquainted with the therapeutics of imagination would be much better able to judge as to this question. With Dr. Halley's motives for putting forward his opinion, I have no concern; but however great may be his desire for scientific truth, I am ata

loss to perceive that the admission of his argument can be justified by the insufficiency of his evidence.

I hope that it will be seen, that in venturing to offer a remark as to the apparent improbability of arsenical paper-hangings being prejudicial to health, I was not influenced by the opinions of those, who, being interested in the question, would naturally be biased, but did so simply from an impartial consideration of the facts of the case.

GLYCERINA CUM FERRI IODIDO.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—As an interest appears to exist at present respecting the preparation Glycerina cum Ferri Iodido, perhaps the following formula will be acceptable to many of your readers for its simplicity, quickness, and perfectness :—

Put into a 3 oz. phial $2\frac{3}{4}$ fluid ounces of pure (colourless and anhydrous—sp. gr. 1267) glycerine, and then insert a small glass funnel, so that the point shall be immersed in the glycerine; place a 2 drachm filter into the funnel. Into another (1 oz.) phial put one-eighth of an ounce of clean iron wire, cut into small lengths, one-fourth of an ounce distilled water, and 100 grains of iodine; shake the whole until the froth is white, and then at once decant the liquid into the filter aforementioned. When it is all through the filter, put ten drops of water into the 1 oz. phial, and shake it about to wash the iron wire, and then drop it round the upper part of the filter to wash it also.

The contents of the phial require now only to be shaken together, and the process is completed. The whole may be done in less than half an hour; and if the glycerine be of the character above mentioned, and the operator expert, the preparation will be colourless and quite thick, and, what appears to us of some moment, of similar strength to the Syrupus Ferri Iodidi, E.*

We are, Sir, your obedient servants,

T. & H. Smith.

21, *Duke Street, Edinburgh, and*
69, *Coleman Street, City, London.*
8th May, 1858.

REPORT OF THE RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION, AND OF THE APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

BY B. H. PAUL, Ph.D.

(*Continued from p.* 563.)

Caproic Acid.—Since the discovery of this acid in butter by Chevreul, and its subsequent recognition in cocoa-nut oil, it has been prepared artificially by Messrs. Frankland and Kolbe from cyanide of amyl.

M. Wurtz† has recently prepared cyanide of amyl for this purpose. He states that it turns the plane of polarization from left to right. The caproic acid obtained from it by the action of potash, boiled at 388°.4 F. It turned the plane of polarization from left to right. Hence it may be inferred that this radical exists in caproic acid, since those derivatives of amylic alcohol, which contain amyl unaltered, also possess rotary power. But this is probably not the case with valerianic acid, which has no rotary power, and in which the amyl molecule is probably modified. Caproic acid may be regarded as a derivative of formic acid, with amyl in the place of hydrogen. Thus :—

Formic acid. $C_2 \left\{ \begin{matrix} H \\ H \end{matrix} \right\} O_2$ O_2

Caproic acid. $C_2 \left\{ \begin{matrix} [C_{10} H_{11}] \\ H \end{matrix} \right\} O_2$ O_2

By electrolysis, the caproic acid obtained from cyanide of amyl, yields amyl

* To make the preparation similar in strength to the Ph. L. and Ph. D., 96 grs. and 112 grs. of iodine respectively will be required.—T. and H. S.

† *Annal. de Chim. et de Phys.*, Sér. 3, li., 358.

which has a very marked rotary power. This fact is especially interesting, since M. Wurtz has observed that the caproic acid, obtained from cocoa-nut oil, has no rotary power.

Occurrence of Creatine, and Simple Method of obtaining it.—Hr. Städeler* recommends digesting the chopped flesh, mixed with coarsely-powdered glass, with about one and a half times its bulk of alcohol, at a gentle heat, and then pressing out the liquid. This liquid is then to be distilled, the residue treated with basic acetate of lead, the excess of lead separated from the filtrate by sulphuretted hydrogen, and the clear liquid evaporated to a syrupy consistence. Upon cooling, creatine crystallizes out; and after some days the crystalline mass is spread out on a piece of unsized paper, so as to absorb the mother liquor. The crystals are then dissolved in hot water or alcohol, and recrystallized.

In this way Hr. Städeler has obtained creatine from the muscular substance of the ox, dog, pigeon, spinax acanthus, and Petromyzon fluviatilis. In the brain of pigeons, and also in the brain of dogs, creatine was found, in the latter case, together with urea.

Density of Ozone.—Dr. Andrews and Mr. Tait have made some experiments, which lead them to the conclusion that, provided ozone is an allotropic modification of oxygen, its density is four times as great as that of oxygen. As ozone cannot be obtained pure, but only mixed with a very large proportion of ordinary oxygen, the density could only be determined by heating the ozonized oxygen to 448° F. and upwards, and then observing the alteration of volume.

By this means it was found that there was always an augmentation in the volume of the gas, and this was accurately measured. The amount of ozone in the gas operated upon was $\frac{1}{350}$ its weight, when the gas was obtained by the electrolysis of a mixture of water with one-eighth sulphuric acid; and was about double as much when a mixture of equal parts sulphuric acid and water was submitted to electrolysis.

Adulteration of Peru Balsam with Castor Oil.—Dr. Wagner† recommends for the detection of this adulteration, a method based upon the characteristic reaction of aldehydes with bisulphites of the alkalies. Pure Peru balsam gives by distillation acid products, but no aldehyde. Castor oil, on the contrary, yields the aldehyde of œnanthylic acid.

In testing Peru balsam, about one hundred grains is to be distilled, until the portion which has passed over amounts to rather more than one-half. This distillate, consisting of two layers of liquid, is then to be shaken with baryta water, the floating layer of oil removed by means of a pipette, and then shaken with a concentrated solution of bisulphite of soda. If the Peru balsam contained castor oil, this liquid immediately solidifies to a crystalline mass, from which—after recrystallizing from boiling alcohol, until the smell of acrolein is removed—the œnanthylic aldehyde may be separated, by means of potash or dilute sulphuric acid, as a colourless liquid, insoluble in water.

The crystalline soda compound has the composition $C_{14}\ H_{13}\ Na\ S_2\ O_6 + 4$ aq.

More probably it contains a mixture of œnanthylic and caprylic aldehydes, and may be better represented by the following formula:—

$$\left.\begin{matrix} C_{14}\ H_{13} \\ C_{16}\ H_{15} \end{matrix}\right\} Na\ S_2\ O_6 + 4\ aq.$$

since it appears that by the dry distillation of castor oil, caprylic acid is produced as well as œnanthylic acid.

Derivatives of Eugenic Acid.—Some time since, M. Cahours‡ observed, that by the reaction of chlorine compounds of organic acid radicals, with hydride of salicyle, substances are produced that are isomeric with those produced in a similar manner from benzoic acid, but differ from these latter especially in being neutral, and not liable to decomposition with alkalies, even at an elevated temperature.

More recently,§ with the view of elucidating the general relations of isomeric substances, he has studied the reaction of the chlorine compounds of organic acid radicals with eugenic acid ($C_{20}\ H_{12}\ O_4$), which is isomeric with cuminic acid. He

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* *Journal für prakt. Chemie*, lxxii., 256.
† *Archiv. der Pharmacie.*
‡ *Annalen der Chemie und Pharmacie*, civ., 109.
§ *Comptes Rendus*, xlvi., 229.

found that the products were hydrochloric acid and a crystalline substance, insoluble in hot or concentrated caustic potash, but convertible by solid hydrate of potash into eugenic acid, and the acid corresponding to the chlorine compound used. While cuminic acid, by reaction with such chlorine compounds, yields the so-called anhydrous double acids, which, in contact with caustic potash solution, are converted into the simple acids, eugenic acid yields the following neutral substances, not acted upon by hot caustic potash :—

Benz-eugenyl, C_{34} H_{16} O_6.
Tolu-eugenyl, C_{36} H_{18} O_6.
Cum-eugenyl, C_{40} H_{22} O_6.

These substances present characters which are analogous to those of the substances previously described as being derived from hydride of salicyle, in so far that by boiling with caustic potash or hydrochloric acid, they are not affected.

M. Cahours has also observed, that according as hydrogen in the radical or basic hydrogen was replaced by another simple or compound substance, isomeric derivatives of entirely different chemical characters were produced.

Reaction of Boron with Nitric Oxide.—In consequence of the remarkable chemical affinity between nitrogen and boron,* it was desirable to ascertain what action would take place between this substance and nitric oxide. It was found that amorphous boron, heated to a point below redness, took fire, and burnt with a brilliant white flame. The product of this reaction was grey, and consisted of a mixture of boracic acid and nitride of boron, coloured by a slight admixture of unaltered boron. This latter and the boracic acid could be extracted from the residue by means of water and nitric acid. The nitride of boron thus produced, presented all the characters of that obtained by other methods. When mixed with fused caustic potash, a copious evolution of ammonia took place. In this reaction, therefore, both the constituents of the nitric oxide entered into combination with the boron ; five equivalents boron and three equivalents nitric oxide, yielding two equivalents boracic acid and three equivalents of nitride of boron. The decomposition of nitric oxide is not effected by boron in either of the crystalline conditions at such temperatures as can be borne by glass bottles.

Detection of very minute Quantities of Soluble Iodides.—Dr. C. W. Hempel† recommends the following method :—

The solution is placed in a glass tube, some perchloride of iron added, and enough sulphuric acid to render the mixture colourless. Thin solution of starch made with boiling water is then added, in the proportion of about two drops to each five cubic centimeters, the tube covered, and the mixture allowed to deposit. The presence of iodine is indicated by the degree of reddish coloration of the amylum.

Experiments made with known quantities of iodide of potassium gave the following results :—

Experiment.	Iodine used.					Coloration of the Amylum.
1.	0.00001	grm. in	4	cub. cent.	water	Brownish lilac.
2.	0.000003	"	5	"	"	Orange.
3.	0.000002	"	5	"	"	Faint orange.
4.	0.000001	"	2	"	"	Deep rose colour.
5.	0.0000003	"	0.5	"	"	Distinct rose colour.
6.	0.0000001	"	0.5	"	"	Faint rose colour.

In the first experiment the lowest layer of amylum was scarcely coloured, while the upper layer presented deep coloration. It was probable that this might be due to the great dilution of the perchloride of iron, but this was not found to be the case.

When the solution containing iodide is mixed with perchloride of iron and sulphuric acid, in a glass vessel with a ground stopper, and chloroform is added in sufficient quantity to render the liquid very turbid after shaking it, and when the air bubbles have separated, the chloroform is coloured according to the amount of iodine. The colour is best observed by allowing the chloroform to settle, then inserting in the place of the stopper a cork with a funnel-shaped cavity, through

* Wöhler—*Annalen der Chemie und Pharmacie*, cv., 69.
† *Ibid*, cv., 259.

which passes a very fine tube of colourless glass, and inverting the glass vessel, so that the chloroform may collect in the glass tube. With small quantities of iodine the colour is not always red, but more lilac, until the chloroform has collected together.

Experiments made with known quantities of iodide of potassium gave the following results :—

Experiment.	Iodine used.						Coloration of Chloroform.
1.	0.0001	grm.	in 200	cub.	cent.	water	Very deep violet.
2.	0.00001	"	20	"	"	.....	Very deep pink.
3.	0.000002	"	3	"	"	.....	Very deep reddish lilac.
4.	0.000001	"	3	"	"	.....	Very deep lilac violet.
5.	0.00002	"	400	"	"	with six drops perchloride of iron and a few drops of sulphuric acid ...	Distinctly pink.

Chloroform is coloured distinctly pink by 0.000001 grm. of iodine, as may be seen by the following experiment :—The iodide of potassium is placed in a tube of about 0.5 cub. cent. capacity, as much water and acidulated perchloride of iron added as will fill half of the tube, the liquid then shaken with a drop of chloroform, the tube filled up with water and corked. When the tube is held horizontally over a porcelain plate, the colour of the chloroform is distinctly recognizable.

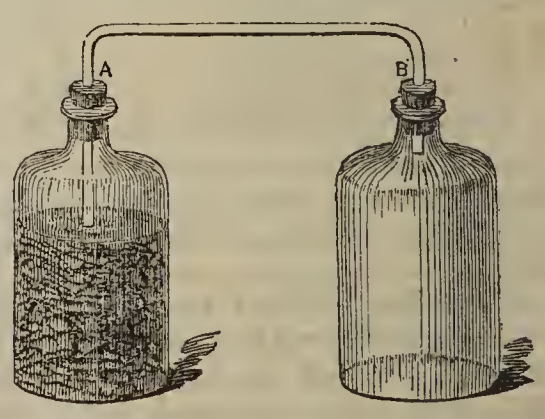
In order to ascertain whether perchloride of iron might not, even when very dilute, decompose hydriodic acid, a solution containing in 5 cub. cent. 0.000004 grm. iodine, was mixed with 0.05 cub. cent. very dilute acidulated perchloride of iron solution, and the whole shaken with two drops of chloroform, with production of a deep pink coloration. The same experiment repeated with amylum, again presented the above mentioned phenomena ; the upper layer alone was orange-coloured.

In observing the coloration, the tube should be placed against a white surface, and care must be taken to avoid the influence of green-coloured walls, in producing complementary purple colour.

Nitrides of Tungsten and Molybdanum.—Professor Wöhler* has found that when the chlorides of tungsten or molybdenum are placed in the bottom of a long test tube, and covered with dry fragments of chloride of ammonium, and heated to redness, in such a manner that both salts are volatilized and their vapours mixed, a complete decomposition takes place ; and when the excess of chloride of ammonium is driven off, the whole inner surface of the tube is found to be covered with a black semi-metallic substance, that may be detached partly as brittle flakes, and partly as a black powder.

The substances thus produced from the chlorides of either metal are either nitrides or amide compounds. When heated in the air, they burn, yielding tungstic or molybdic acids. When melted with caustic potash, a large quantity of ammonia is produced.

Estimation of the Amount of Nicotine in Tobacco.—Dr. Schiel† employs for this purpose an apparatus, consisting, as shown in the woodcut accompanying, of two strong narrow-necked flasks, connected by a bent tube. The cut tobacco is extracted with ammoniacal ether in the flask *A*, which is placed in cold water. When, after some time, the flask *A* is taken out of the cold water, and the flask *B* placed in it, while the flask *A* is placed in a basin containing warm water ; the ether vapour forces the solution of nicotine through the tube, extending to the bottom of the flask *A*, into the flask *B*. Then placing the flask *A* in cold water, and the flask *B* in warm water, the ether distils back again, leaving the nicotine in the flask *B*. By several repetitions of this proceeding, the tobacco may be perfectly exhausted in a short time, and the quantity of nicotine may then be estimated by the volumetric method. Before the flask *B* is connected with the tube, it is advisable to pour in a little ether, for the purpose of displacing the air.



* *Annalen der Chemie und Pharmacie*, cv., 258. † *Ibid.*, cv., 257.

SUBCARBONATE OF BISMUTH.

This preparation is strongly recommended by Professor Hannon, of the University of Brussels, as a substitute for the tris-nitrate of bismuth. The following are some of the advantages attributed to it. It is very soluble in the gastric juice, and its action is very prompt, without producing that sensation of weight in the stomach which often follows the tris-nitrate; hence it can be continued much longer than the latter preparation; its alkaline properties give it the great advantage of neutralizing the excess of acidity which so often exists in the stomach in the various forms of indigestion. It rarely causes constipation. Dose for adults, from ten to forty grains; for infants, from one to five grains.

SUPERPHOSPHATE OF IRON AND LIME.

At a meeting of the Medical Society of London, February 20th, Dr. Routh exhibited a new preparation of superphosphate of iron and lime. It was prepared by dissolving phosphate of iron and phosphate of lime in equal proportions in hot metaphosphoric acid, and adding sugar to the solution to make a syrup. Some years ago he had recommended the syrup of the superphosphate of iron (elsewhere known as the biphosphate of iron) as a remedy for weakly children, and those weak adults with mental diseases. Its uses as such had been since amply proved. He now recommended this as an excellent remedy in rickets and weak children with deficient osseous development. It was very pleasant to take, and did not blacken the stools. Each ounce of the syrup contained five grains of iron and five of phosphate of lime.

PROSECUTION OF A PHYSICIAN IN FRANCE FOR FURNISHING MEDICINES TO HIS PATIENTS.

The legal tribunal at Bordeaux, known as the *Cour de Cassation*, has lately been the scene of a lawsuit of considerable interest to the pharmaceutist.

The facts of the case may be briefly stated as follows:—

The town of Angoulême contains eleven pharmaceutical establishments, but not one specially homœopathic.

A homœopathic physician named Moreau, practising in the town, was in the habit of distributing to his patients homœopathic medicines, obtained by him from a *pharmacie* in Paris. Upon the plea that for a physician to supply medicines was illegal, and an infringement of the rights of the pharmacien (albeit the medicines in question were alleged to be supplied to the patients *gratuitously*), ten of the pharmaciens of Angoulême instituted legal proceedings against Moreau before the Correctional Tribunal of that town. This action having been decided in favour of the defendant, was carried by appeal before the Imperial Court of Bordeaux, the judgment of which, under date 21 Nov. 1856, confirmed the decision of the inferior tribunal.

The plaintiffs, however, determined to persevere with the prosecution; and the case having been carried before the Criminal Chamber of the Cour de Cassation, that body reversed the decision of the Imperial Court of Bordeaux, and referred the case to the Imperial Court of Poitiers. The judgment of this Court was again in favour of the defendant. Again the case was carried before the Cour de Cassation; and this Court having, with its united chambers, given solemn audience to the evidence, pronounced a judgment in favour of the pharmaciens. Here the matter at present rests, and we presume it cannot be carried any further.

M. Dupin, *Procureur Général*, in delivering judgment, made an eloquent address, tracing the history of Pharmacy from the earliest times down to the period of the laws by which it is at present regulated in France. From this address, which is well worthy of perusal, we make a few extracts.

After describing the origin and establishment of academies of medicine and surgery, the learned judge alluded to the foundation at Paris in the year 1777 of the College of Pharmacy.

"In the National Academy of Medicine," said he, "we find these three branches —medicine, surgery, and pharmacy—united in their deliberations, in order to enlighten the Government upon all questions relating to the public health, though divided in the exercise of their respective professions.

"The law which has instituted these professions protects them, and as we see the legal practitioner protected against the unqualified, so we find the duly recognized physician protected against the uncommissioned quack doctor, the surgeon against the bone-setter, the pharmacien against the vendors of patent or secret remedies, and even against the physician, who, trenching on the department of pharmacy, may undertake himself to furnish the medicines he prescribes for his patients.

"And this is but just : for the law compels the pharmacien to a long course of study, theoretical as well as practical ; it subjects him to examinations and ordeals ; it obliges him in the exercise of his profession to keep an open shop, supplied with medicinal substances, simple and compound, as well as with the *ability* to prepare every other remedy either that is ordered in the Codex, or that may be dictated by the will or caprice of the physician.

"Besides this, there are imposed upon him strict precautions and great responsibility in the custody and sale of poisonous substances ; and, lastly, his establishment is subject to annual official visits.

"These are the conditions upon which a monopoly of the sale of medicines is granted to the pharmacien."

Conformably with the concluding sentence of the address of the learned judge—"Nous estimons qu'il y a lieu de casser"—the Court decreed judgment in terms to the following effect :—

The Court,

Having heard Mr. Councillor Quénoble in his report, Messrs. Béchard and Hérold, the advocates of the parties, in their observations, and Mr. Procureur Général Dupin in his summing-up, and having deliberated thereupon ;

Considered clauses 25, 33, and 36 of the law of the 21 Germinal, year XI., and the law of the 29 Pluviose, year XIII. ;

Considered that the law of the 21 Germinal, year XI., has definitely enacted the separation of medicine and pharmacy, and constituted the latter a particular profession ;

That with this end, it has created and established schools of pharmacy, in juxtaposition with schools of medicine, and has appointed the course of study, theoretical and practical, to which the title of pharmacien shall be subservient ;

That in exchange for the obligation imposed upon the pharmacien, the said law has entrusted him with the exclusive right of preparing and vending the medicines ordered in the Codex or prescribed by a physician ; that as none may practice medicine without having at least the title of *Officier de Santé*, so none may prepare or vend medicines if not a *pharmacien* ;

That, although by clause 27 of the said law, officers of health (*Officiers de Santé*), established in a locality where there exists no open *pharmacie*, are at liberty to furnish medicines to persons to whom they may be called ;

Yet this provision being entirely exceptional, is inapplicable to a locality which numbers several pharmaciens keeping open shops ; and when, moreover, there is nothing to prove that on the part of these pharmaciens there has been a refusal to comply with any medical order whatever ;

That it is impossible to justify the supplying of medicines by a physician, from the fact of such medicines having been purchased in a special establishment. That to provide medicines for the greater number of cases that present, and to furnish them habitually to patients, is to intrench upon the rights of the pharmacien in an illegal manner ;

Considering that the impugned sentence proves in fact ;—

1. The existence at Angoulême of several open chemists' shops ;
2. The supplying and uttering by Dr. Moreau of medical preparations ;

That, notwithstanding these proofs, the sentence in question refuses to apply to the said Moreau the law of the 21 Germinal, year XI., and the law of the 29 Pluviose, year XIII. ; in doing which it has formally violated the said laws ;

Renders null and void the sentence of the Imperial Court of Poitiers of 7 May, 1857 ; and to the effect that a sentence may be passed in conformity with the law, upon the appeal from the judgment given by the Correctional Tribunal of Angoulême, 16 Dec., 1856, refers the cause and parties to the Imperial Court of Bourges ;

Orders, &c.

POISONING BY OPIUM.

On Thursday, April 29th, Mr. Badger, coroner, held an inquest at Greasbrough, near Rotherham, on the body of a young woman named Fanny Wilkinson, who died on the previous day from an overdose of opium. The deceased was servant to the Rev. W. Byers, incumbent of Greasbrough, and being confined to bed on Wednesday, from a severe attack of diarrhœa, with the approval of her mistress sent a fellow-servant, named Goulding, for an ounce of powdered rhubarb, to mix with other ingredients as a medicine. Goulding went to the shop of Mr. George Storry, grocer, draper, and druggist to the village, for the rhubarb. Storry weighed her about half an ounce of powder, all he had of that kind, from a small bottle. The girl remarked that the powder was very dark, and Storry agreed that it was, but made no further observation about it. On the supposed rhubarb being shown to her, the deceased also said that "it was very dark, she liked it best when red." Goulding mixed one teaspoonful of the powder in cold water, with sixteen drops of laudanum, and some magnesia and essence of ginger. The deceased said that it was very nasty to take, but drank the whole of it. A quarter of an hour later, she complained of feeling much benumbed and sleepy, and inquired whether Goulding was sure she had not given her too much laudanum. Goulding said she was very careful to count only sixteen drops, and recommended the deceased to sleep, as it would very likely make her better. The deceased fell asleep, and after a short time was heard to moan and breathe very heavily. Being unable to awake her, Mrs. Byers sent for Mr. Blythman, Surgeon, Swinton, who found the young woman suffering from a narcotic poison, and discovered that the supposed rhubarb was in reality powdered opium. Mr. Blythman obtained from Storry the bottle from which the opium had been weighed, and which was thus labelled—"Pulv. opii Turc. opt." The patient died the same evening, and on a *post-mortem* examination no less than eight to ten grains of opium were detected in the stomach, thus clearly showing that the deceased had been poisoned with the spoonful of opium, which contained about thirty grains, equal to 600 drops of laudanum. Mr. Storry appeared before the jury, and stated that he took his shop on the 9th of April, with the stock of groceries, draperies, and drugs, including the powdered opium; that he understood from the outgoing tenant that the powder was rhubarb, and he himself supposed so from seeing the word "Turc." on the label. He had not a thorough acquaintance with drugs, and sold the powdered opium ignorantly. The jury were of opinion that Storry had been guilty of culpable negligence and ignorance, and returned a verdict of "Manslaughter" against him. He was committed to York assizes for trial.—*Liverpool Northern Times, May 4th.*

ACCIDENTAL POISONING BY LAUDANUM.

An inquest was held at Wortley, on Tuesday, May 4th, on the body of John Hartley Thompson, a child fifteen months old, the son of Zilpah Thompson, widow, New Wortley. A soothing medicine had been ordered by the medical attendant for the child, who had been ailing for some time, but his assistant, after making up the preparations, and labelling them correctly, addressed the wrong bottle to Mrs. Thompson, and sent her, instead of the mixture suitable for an infant, a strong dose of laudanum intended for an adult. The other phial was addressed to Mrs. Middleton, a neighbour of Mrs. Thompson's. The wrapper of the child's medicine was removed without particular attention being paid to the address, the draught was administered, and the child shortly afterwards died from its effects. Mr. Scott's assistant having been severely reprimanded for his negligence, both by the coroner and the jury, a verdict of "Died from an overdose of laudanum" was returned.—*Leeds Mercury—Manchester Guardian, May 7th.*

EFFECTS OF NITRO-GLYCERINE OR GLONOINE.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—In the last number of your Journal it is stated in reference to nitro-glycerine—"Mr. Field has subsequently repeated the experiments on himself, and has got results similar to those described by Drs. Fuller and Harley." It is quite true that on one occasion two drops of the solution of nitro-glycerine had no effect on me beyond the production of a very decided headache, but it must be understood that I then used a less powerful specimen, and, as a measure of safety, it should also be stated that complete insensibility was caused by a smaller quantity of another

specimen when applied to the tooth of a patient who was totally ignorant of the agent employed for his relief. Equally marked effects have been observed by other medical practitioners who have experimented with this remarkable medicine. I am still engaged in investigating the therapeutic properties of nitro-glycerine, and am daily more convinced of two important facts connected with it, viz., the great variation in the strength of different specimens, and the very marked difference in the susceptibility to its influence of the same individual under altered circumstances, depending, I imagine, on the condition of the nervous system at the time the drug is taken.

28, *Old Steine, Brighton, May* 24, 1858. A. G. Field, F.R.C.S.

BOOKS RECEIVED.

Medical Jurisprudence. By Alfred Swaine Taylor, M.D., F.R.S., &c. Sixth Edition. London: John Churchill, New Burlington Street. 8vo, pp. 976. 1858.

The Unity of Medicine: its Corruptions and Divisions, as by Law Established in England and Wales; with their Causes, Effects, and Remedy. By a Fellow of the Royal College of Surgeons. With a coloured Chart. London: H. Bailliere, 219, Regent Street, and 209, Broadway, New York. 1858.

The Influence of Sewer Emanations. By T. Herbert Barker, M.D., Lond. London: Printed by T. Richards, 37, Great Queen Street. 1858.

TO CORRESPONDENTS.

Geologist (Ardrossan).—Soluble silicate of soda would probably answer the purpose. See page 543 of our last number.

Kappa (London).—*Skeleton leaves.* Vol. xiii., p. 192.

F. W. F. (Northampton).—(1.) *Sale of arsenic.* The witness must be of full age, and known both to the purchaser and the person selling the arsenic.—(2.) The presence of bichloride of mercury in mercurial ointment may be detected by washing the ointment with distilled water, and then applying the usual tests.

"*Brandish*" (Wigan).—The formula for Brandish's Liquor Potassæ is given in Pereira's *Materia Medica*, and also in this Journal, vol. ii., p. 209. It is usually colourless, or nearly so.

"*Civis*" (Lichfield).—Normandy's *Agricultural Chemistry.*

"*The Ghost of Lindley Murray*" (Bognor).—We are not responsible for the grammar of advertisements appearing in this Journal. See *Punch*, May 29, p. 222.

G. E. (Liverpool).—*Tests of the purity of Balsam Copaiba.* Vol. vi., p. 13.

A Registered Apprentice (Oswestry).—(1.) *Proof Spirit.* 5 parts of spirit to 3 parts of water; the specific gravity should be .920.—(2.) *Aqua Rosmarini* is made in the proportion of 1 lb. of the herb to the gallon; if made from the oil, about ʒij. to the gallon.

A Correspondent (Bow) refers with approval to the remarks in this Journal on the Saturday Early Closing of the Wholesale Drug Houses, and hopes that the Retail Druggists will co-operate in promoting the movement by sending their orders early.

A. P. S. (London).—*Artificial Fruit Essences.* Vol. xi., p. 214.

Mr. Wilkinson (Manchester), *Mr. Reynolds* and *Mr. Atkinson* (Leeds), are thanked for their enclosures.

F. W. (West Cowes).—(1.) A Manual is in course of publication by Mr. Churchill. —(2.) Chloroform is generally used for the purpose.

A London Artisan.—The paper attempting to prove that oxygen is identical with mercury was considered a hoax.

H. T. (Manchester).—We think the most probable cause of the failure referred to in the preparation of *Glonoine* has been the want of proper attention to the strength or purity of the ingredients used. The Glycerine should be anhydrous, sp. gr. 1.262; the nitric acid should be monohydrated, sp. gr. 1.52; and the oil of vitriol should be of full strength, sp. gr. 1.845.

Panax quinquefolium.—This is not a proper channel for giving medical advice.

Errata.—At page 579 of our last number, *for* alumina, *read* alum; p. 538, line 5, *for* reasonable, *read* reasonably; p. 539, line 20, *for* numbers, *read* number.

Instructions from Members and Associates, respecting the transmission of the Journal, to the Secretary, 17, Bloomsbury Square.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place.

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